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Journal of Educational Research

Registered June 4, 1929

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THE JOURNAL OF EDUCATIONAL RESEARCH is indexed in the Education Index

Edited and published by A. S. Barr, Professor of Education, University of Wisconsin, Madison, Wisconsin

Entered as second-class matter at the post office of Madison, Wisconsin under the act of March 3, 1879

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The JOURNAL OF EDUCATIONAL RESEARCH is edited and published at Madison, Wisconsin, monthly except June, July, and August by A. S. Barr. The subscription price is $3.50; $4.00 in Canada and in other foreign countries. Single copies 50¢.

Address all communications to A. S. Barr, Department of Education, University of Wisconsin, Madison 6, Wisconsin.

Democrat Printing Company, Madison, Wisconsin

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JOURNAL *of* EDUCATIONAL RESEARCH

Volume XXXVII OCTOBER, 1943 Number 2

A VISUAL SURVEY OF 5000 SCHOOL CHILDREN

M. M. DALTON
Alhambra, California

Editor's note: What percent of children have defective vision? What relation has vision to achievement? The author presents extensive data relative to these and other questions.

JUST what is the relationship between normal vision or defective vision and scholastic achievement? What percent of school children have defective vision? What types of visual defects are most prevalent? Is there a direct relationship between normal or defective vision and intelligence or school achievement? The writer was recently given an opportunity to ascertain the answers to these questions through a survey of over 5000 children in the public schools of Alhambra, California. After the analysis of the results of this survey the reader may be as surprised as the writer at his conclusions.

In the spring of 1938 the Board of Education through its Superintendent, George E. Bettinger, authorized a visual survey of the pupils in the Alhambra City and High School District. The work was carried on under the personal supervision of the Assistant Superintendent and Director of Research, M. R. Stokesbary.

The purposes of the survey were: (1) to get a general picture of the visual condition of the pupils; (2) to find out if possible, the relationship between visual deficiencies and scholarship; (3) to provide a more complete record of the visual condition of all pupils as a basis for referral to parents and as a means of ascertaining serious difficulties that would interfere with school success.

The personnel used in this survey was carefully selected from a group furnished by the Works Progress Administration. The workers were put through a period of training before starting the testing program and were checked at regular intervals on their testing technique. The members of the

testing personnel, while not trained clinicians, seemed to be efficient for the purpose of the survey which was to detect only departure from the normal as shown by the test and not to diagnose.

The machines used in this survey were the Keystones Telebinocular,[1] purchased by the Board of Education. These are plus lens, minus prism stereoscopes equipped with test slides or view cards and a card holder bar graduated for distant or far point vision and reading distance or near point vision. The examination used in this survey consisted of tests for fusion at far point and near point; visual efficiency (acuity) of both eyes and of each eye; vertical imbalance; coordination level (stereopsis); lateral imbalance at far point and near point; and sharpness of image (astigmatism) at far point and near point. All tests were made strictly according to the procedure described by Betts.[2] Under this plan the examiner had to rely entirely upon the answer of the pupil as to what he (the pupil) observed.

The total number of students for which tests were recorded was 5821. Of these 2729 boys and girls were enrolled in grades 3 to 8 inclusive and 3092 in grades 9 to 12. The high school group was made up of 1511 girls and 1581 boys. In the opinion of the writer the subjects are typical of or slightly above the average American school population. The average intelligence quotient of the pupils is 104.

GENERAL RESULTS OF VISUAL TESTS

The results of the survey are shown in a number of tables. Table I shows the number and percentage of students whose vision was normal and the number and percent of those tested who failed in one or more of the twelve tests. In the first column of this table is shown the number of sections of the visual test battery failed. The second column shows the number of elementary pupils failing on none of the tests, one test, two tests etc. The third column shows the percentage of the total number of elementary students failing each number of tests. The other columns show the same type of information regarding the high school pupils.

From this table it may be seen that only 17.6% of the elementary pupils and 12% of the high school pupils passed in all tests. It may also be noted that only one elementary pupil and only three high school pupils failed

[1] Distributed by the Keystone View Co., Meadville, Pa.

[2] Betts, Emmett A. Manual of Directions for Ready to Read (Test), Meadville, Pa., Keystone View Co., 1934.

in all twelve of the tests given. The remainder of the group are distributed between these extremes. The large percentage of students failing in one or more of the tests indicates either that the test shows an excessive amount of defect or that visual defectiveness is very prevalent among school children.

If these tests provide a valid test of the visual ability, the evidence presented in the figures should give educators some pertinent information concerning their pupils. When such enormous failure trends are indicated, some action to reduce the handicap of faulty vision is imperative.

TABLE I

CLASSIFICATION OF PUPILS

(According to Number of Tests Failed)

Number of Tests Failed	Elementary		High School		H. S. Boys		H. S. Girls	
	Number	%	Number	%	Number	%	Number	%
0	479	17.6	370	12.0	15	9.7	217	14.4
1	648	23.7	544	17.6	275	17.4	269	17.8
2	579	21.2	638	20.6	359	22.7	279	18.5
3	406	14.9	587	19.0	319	20.2	268	17.8
4	298	10.9	408	13.2	232	14.7	176	11.6
5	162	5.9	273	8.8	134	8.5	139	9.2
6	86	3.2	141	4.6	61	3.9	80	5.3
7	37	1.4	73	2.4	27	1.7	46	3.0
8	15	.55	23	.74	10	.63	13	.86
9	11	.40	17	.55	3	.19	14	.93
10	6	.22	12	.39	7	.44	5	.33
11	1	.04	3	.097	1	.06	2	.13
12	1	.04	3	.097	----------	----------	3	.20
Total...	2729	100.	3092	100.	1581	100.	1511	100.

Tables II, III, and IV show the number of pupils who passed, were doubtful or failed in certain of the tests pertaining to fusion and muscular imbalance. It will be noted that only five of the 2729 elementary school pupils failed in the introductory test which might indicate that they did not have binocular vision. It may also be noted that the largest number of failures were in the visual ability which the makers of this testing device have termed "Fusion".

In test 2 (Fusion at Far Point) a 5% difference is found in favor of the elementary pupils. Upon further comparison it is found that 5.9% more high school girls than high school boys failed in this test. Test 7 (Fusion at Reading Distance) showed exactly the same trend as test 2. Taken grossly, the findings of these two tests would seem to indicate that approximately

TABLE II

NUMBER OF ELEMENTARY PUPILS PASSING OR FAILING CERTAIN OF THE TESTS

Test	Number Passed	%	Number Doubtful	%	Number Failed	%
1 (Introductory)	2724	99. 8			5	.18
2 (Far Fusion)	1689	61. 9	605	22. 2	435	15. 9
7 (Near Fusion)	1699	62. 3	598	21. 9	432	15. 8
4 (Vert. Imbalance)	2654	97. 3	38	1. 4	37	1. 4
6-A (Far Lat. Imbal)	1603	95. 4	25	.91	101	3. 7
6-B (Near Lat. Imbal)	2539	93. 0	46	1. 7	145	5. 3

TABLE III

NUMBER OF HIGH SCHOOL GIRLS PASSING OR FAILING CERTAIN TESTS

Test	Number Passed	%	Number Doubtful	%	Number Failed	%
1 (Introductory)	1504	99. 5			7	.46
2 (Far Fusion)	975	64. 5	201	13. 3	335	22. 1
7 (Near Fusion)	983	65. 0	234	15. 4	294	19. 5
4 (Vert. Imbalance)	1454	96. 2	21	1. 4	36	2. 4
6-B (Far Lat. Imbal.)	1451	96. 0	2	.13	58	3. 83
6-B (Near Lat. Imbal.)	1424	94. 2	7	.46	80	5. 3

40% of all pupils (including the doubtful cases) have some type of incoordination causing poor vision. In the opinion of the writer this is not necessarily a true picture. The target used in this test consists of four dots of various colors arranged in two vertical rows so that when fused there will appear to be three. These two center dots that are to be fused are the complimentary colors, blue, and yellow, which if of perfect saturation when fused, produce white. The fact that we do not ordinarily have to fuse complimentary colors, and further, that it is impossible to obtain perfect saturation would tend to cause some confusion in the mind of the pupil. The creation of a dilemma will of necessity cause an exaggerated reflex. Persons familiar with stereoscopic tests know there is a wide variance in the stimulus quality of different targets, and it is the opinion of the writer that the dot must be low in the scale.

To satisfy his curiosity, the writer ran a test on 318 elementary school pupils, grades 3 to 8, using the "Wells" target on "ON NE". In this test the letters are placed in a horizontal row and well within the area of binoc-

TABLE IV

NUMBER OF HIGH SCHOOL BOYS PASSING OR FAILING CERTAIN TESTS

Test	Number Passed	%	Number Doubtful	%	Number Failed	%
1 (Introductory)	1575	99.6			6	.38
2 (Far Fusion)	941	59.5	383	24.2	257	16.2
7 (Near Fusion)	930	58.8	400	25.3	251	15.9
4 (Vert. Imbalance)	1537	97.2	14	.89	30	1.9
6-A (Far Lat. Imbal.)	1508	95.3	8	.51	65	4.1
6-B (Near Lat. Imbal.)	1445	91.4	39	2.5	97	6.1

ular fusion. In this test approximately 11% failed and there were no doubtful cases. The pupil either saw the word "ONE" by fusing the two N's or a failure was recorded.

This is not meant as a severe criticism of the test itself but rather as an explanation of the large number of doubtful cases recorded. This Particular test was designed to be used with children who have had no reading and probably serves well in that capacity.

In the Vertical Imbalance test (No. 4) the results confirm the generally known fact that vertical imbalances occur infrequently. This survey indicates that definite imbalances occur in only 18 per thousand cases, only 1.4% of the elementary pupils showed marked vertical imbalance.

The test of Lateral Imbalance at Far Point (No. 6-A) shows 3.7% of the elementary pupils and 4% of high school pupils to be outside the allowable range. Lateral Imbalance at Near Point was found to occur in 5.3% of the elementary pupils, 5.3% of the high school girls and 6.1% of the high school boys.

Data regarding visual efficiency or acuity of school pupils as presented in tables V, VI, and VII. The first column in each of these tables shows the various percents of visual efficiency indicated in the test. The second column shows the number of pupils possessing each of the percentages of visual efficiency indicated when both eyes are being used. The fourth and sixth column shows the same type of information for each eye operating separately.

The results of this test show that a total of 53 or approximately 1% of the pupils show no visual acuity in one of their eyes and that over 12% of the pupils show less than 100 visual acuity with the combined action of both eyes. 20% of the elementary school pupils and 33% of the high school

pupils showed visual acuity in excess of 100%. A more critical analysis of tables VI and VII brings out the fact that nearly twice as many high school girls are deficient in this respect as high school boys. Further findings of this survey indicate that the higher acuity is carried in the right eye. Only one case in 5821 shows acuity of 110% in the left eye while there are 8 cases showing this acuity in the right eye. The ratio of zero acuity (ambliopia or amaurosis) of the left eye to the right eye is shown to be 2 to 1.

Table VIII shows the results of the test of "Coordination Level" or "Stereopsis". The first column in this table shows the various percentages

TABLE V

RESULTS OF VISUAL ACUITY TESTS WITH ELEMENTARY SCHOOL PUPILS

Acuity Percent	Test 3A BOTH EYES		Test 3B LEFT EYE		Test 3C RIGHT EYE	
	Number	%	Number	%	Number	%
0	2	.07	17	.62	8	.29
20			5	.18	4	.15
30			6	.22	4	.15
40	3	.11	8	.29	24	.88
50	6	.22	3	.11	10	.37
60	13	.5	24	.88	30	1.1
70	18	.66	78	2.9	16	.66
80	46	1.7	125	4.58	83	3.4
90	241	8.8	302	11.1	344	12.6
100	1859	68.1	1886	69.1	1870	68.4
105	528	19.4	275	10.1	330	12.1
110	13	.47			4	.15
Total	2729	100.	2729	100.	2729	100.

of stereopsis indicated in the test. The second and third columns show the number and percent of elementary pupils who were found to have each of various percents of stereopsis. The other columns show the same information concerning high school pupils. The writer believes this is the first time such complete data has been published on stereopsis or depth vision. The figures indicate that elementary pupils (grades 3 to 8) have a higher percentage of depth vision than is shown by the high school pupils. It will also be noted that the number of high school girls showing zero stereopsis is twice as great as that of high school boys. Only 66% of the girls and 73% of the boys show 100% stereopsis.

A plausible explanation of the difference between elementary and high school pupils could be that the advance of the pupil through the grades

TABLE VI

RESULTS OF VISUAL ACUITY TESTS WITH HIGH SCHOOL GIRLS

Acuity Percent	Test 3A BOTH EYES		Test 3B LEFT EYE		Test 3C RIGHT EYE	
	Number	%	Number	%	Number	%
0			10	.66	8	.53
20			1	.06		
30	1	.06	8	.53	4	.26
40	6	.39	9	.59	19	1.25
50	3	.19	3	.19	12	.79
60	16	1.05	28	1.85	13	.86
70	17	1.12	63	4.17	18	1.19
80	33	2.18	70	4.63	52	3.44
90	179	11.8	235	15.5	243	16.1
100	869	57.5	900	59.5	928	61.4
105	386	25.5	184	12.1	214	14.2
110	1	.06				
Total	1511	100.	1511	100.	1511	100.

imposes an increasing visual load. If there is an imbalance in the ocular musculature the zone of comfort may soon be exceeded and suppression of one eye with loss of stereopsis results. Again an increased amount of reading with its attendant increased concentration tends to bring errors of motility to the level of consciousness to be eliminated by mental suppression.

We speak of the increasing visual load, but perhaps we should use this term with more discretion, since it is actually an increasing mental load. As far as the actual visual load is concerned, school authorities require from the

TABLE VII

RESULTS OF VISUAL EFFICIENCY OR ACUITY TESTS WITH HIGH SCHOOL BOYS

Acuity Percent	Test 3A BOTH EYES		Test 3B LEFT EYE		Test 3C RIGHT EYE	
	Number	%	Number	%	Number	%
0			7	.44	3	.19
20			3	.19	1	.06
30			4	.25	2	.13
40	1	.06	8	.51	10	.63
50	1	.06	7	.44	12	.76
60	10	.63	20	1.3	21	1.33
70	10	.63	44	2.8	13	.82
80	23	1.45	88	5.6	38	2.4
90	89	5.6	138	8.7	178	11.3
100	788	49.8	1008	63.8	970	61.4
105	656	41.5	253	16.0	329	20.8
110	3	.19	1	.06	4	.25
Total	1581	100.	1581	100.	1581	100.

TABLE VIII

RESULTS OF TEST OF COORDINATION LEVEL OR STEREOPSIS

Percent Stereopsis	Elem. Pupils		H. S. Girls		H. S. Boys	
	Number	%	Number	%	Number	%
0	59	2.2	94	6.22	52	3.3
10	15	.55	4	.26	8	.51
20	11	.40	10	.66	19	1.2
30	10	.37	5	.33	4	.25
40	5	.18	6	.39	5	.32
50	4	.15	3	.19	3	.19
60	79	2.9	80	5.3	82	5.2
70	89	3.3	140	9.3	125	7.9
80	40	1.5	48	3.2	40	2.5
90	105	3.9	123	8.14	81	5.12
100	2312	84.6	998	66.04	1162	73.5
Total	2729	100.	1511	100.	1581	100.

printers of text books a first grade text of 20/150 (Snellen Standard), for second and third grade texts 20/100 is required, and for grades succeeding this the size of the type must be kept well above the minimal size for adults.

So we see that the factor of safety as far as eyestrain is concerned in relation to type size for reading is ample. The developing mind trying to grasp the meaning of the printed page, using the sense of sight as the contacting medium, sweeps the eyes forward and back, and the number of fixations and regressions is directly proportionate to the difficulties presented by the text. If we could remove the mental factor there would be no relation between fixations or regressions and the speed of reading.

In striving to better understand just what takes place in the act of reading, the writer has, by experiment succeeded in separating visual acuity from mental acuity, and was astonished to find how enormous the factor of *perceptual fill-in* is as compared to what is actually seen by the eye.

In reference to stereopsis or the visual factor of depth vision, a sidelight might prove of interest. While our report includes the 3rd to 12th grades only, the survey of younger children indicates that a much larger percentage of the kindergarten and first grade pupils have zero stereopsis but that this faculty develops very rapidly after that age period.

Tables IX, X, XI, and XII show the results of the tests for "Sharpness of Image" (Test 8-A and 8-B) at Near Point and Far Point respectively. The slides used in this test include six large yellow dots for each eye in

which are placed various numbers of parallel black lines; the lines in each dot running at a different angle.

The first column in each of these tables indicates the number of tests failed. The other columns show the number and percent of pupils failing in each of the number of sub tests indicated in the first column. Tables IX and XI pertain to the left eye and Tables X and XII to the right eye. It will be noted that much greater defect in sharpness of image was found at the Far Point than at reading distances and that a much greater percent of high school girls showed defective in this respect than either high school boys or elementary pupils.

TABLE IX

SHARPNESS OF IMAGE AT READING DISTANCE

Left Eye

Number of Tests Failed	Elementary		H. S. Girls		H. S. Boys	
	Number	%	Number	%	Number	%
0	2653	97.2	1486	97.1	1560	98.7
1	36	1.3	13	.86	7	.44
2	8	.29	7	.46	4	.25
3	10	.37	10	.66	3	.19
4	6	.22	3	.19	1	.06
5	4	.15	4	.24	1	.06
6	12	.44	6	.39	5	.32
Total....	2729	100.	1511	100.	1581	100.

TABLE X

SHARPNESS OF IMAGE AT READING DISTANCE

Right Eye

Number of Tests Failed	Elementary		H. S. Girls		H. S. Boys	
	Number	%	Number	%	Number	%
0	2651	97.1	1457	96.4	1559	98.6
1	33	1.2	17	1.12	14	.89
2	12	.44	14	.92	2	.13
3	12	.44	6	.39	2	.13
4	4	.15	8	.53	2	.13
5	6	.22	4	.26		
6	11	.40	5	.33	2	.13
Total....	2729	100.	1511	100.	1581	100.

TABLE XI

SHARPNESS OF IMAGE AT FAR POINT DISTANCE

Left Eye

Number of Tests Failed	Elementary		H. S. Girls		H. S. Boys	
	Number	%	Number	%	Number	%
0	2322	85.1	1088	72.0	1337	84.6
1	143	5.2	110	7.3	86	5.4
2	103	3.8	95	6.3	69	4.4
3	63	2.3	63	4.2	35	2.2
4	38	1.4	50	3.3	23	1.5
5	26	.95	32	2.1	13	.82
6	34	1.3	73	4.8	18	1.1
Total....	2729	100.	1511	100.	1581	100.

TABLE XII

SHARPNESS OF IMAGE AT FAR POINT DISTANCE

Right Eye

Number of Tests Failed	Elementary		H. S. Girls		H. S. Boys	
	Number	%	Number	%	Number	%
0	2274	83.3	1078	71.3	1314	83.1
1	178	6.5	105	7.0	104	6.6
2	101	3.7	87	5.5	78	4.9
3	57	2.1	77	5.9	47	3.0
4	35	1.3	54	3.6	14	.89
5	36	1.3	27	1.8	11	.70
6	48	1.8	83	5.5	13	.82
Total....	2729	100.	1511	100.	1581	100.

RELATION OF VISUAL DEFECTS TO OTHER FACTORS

Academic Achievement.—A second phase of this study of visual defects resulted from the questions that arose in the extensive eye testing program. Educators have recently wished to know what relation exists between visual defects and academic achievement.

Several studies have been made in this field but most of these have been limited to small groups of students or to the relationship of one or two types of visual defect with reading ability. Swanson and Tiffin[1] conducted a study

[1] Swanson, Donald E., and Tiffin, Joseph. "Betts' Physiological Approach to the Analysis of Reading Disabilities as Applied to the College Level," *Journal of Educational Research*, XXIX (February, 1936), 433–448.

with college Freshmen to determine whether deficiencies shown by Betts' tests differentiate significantly between poor and good readers at the college level. Their results indicated no significant differentiation.

Witty[2] has reported a study of 100 public school pupils in which an attempt was made to show the relationship of poor reading to such factors as fusion difficulties and muscle imbalances. As a result of his study he concluded that poor readers are not characterized by a higher incidence of visual defects than are good readers, but that correction of defects may improve the reading ability of poor readers and of readers who exhibit no reading difficulties.

In this part of the Alhambra study comparisons are made between the group of elementary school pupils considered sufficiently defective in vision to justify the notification of parents and another group of elementary pupils none of whom showed defect in the Betts' visual tests. Letters were sent to the parents of 577 of the 2729 elementary pupils tested. Complete records were available for 457 of these pupils.

As a basis of comparison, a control group of 204 pupils was selected. The comparison of the matching of these two groups is shown in Table XIII. From the data shown in this table it will be noted that the two groups were quite well matched. The average age and grade placement in school was almost the same. The average reading grade placement also indicates that the two groups were of quite similar academic ability and therefore affected by, and able to benefit similarly from the same teaching devices. The average intelligence quotient of the two groups of girls was exactly the same and it varied only two points (105 and 107) between the two groups of boys. This indicates that the randomly sampled normal vision group was not only of quite similar intelligence but that evidently the type of defective vision found in school children does not significantly affect the intelligence or academic aptitude. The comparison of the two groups on the basis of manual and mental tendencies indicates although the groups were quite similar, a larger percent of mentally inclined pupils was found in the defective vision groups than in the normal vision groups according to subject estimate of their teachers.

Table XIV shows how the 457 elementary pupils with defective vision compared with the control group of 204 elementary pupils with normal

[2] Witty, Paul A. "Factors Associated with the Etiology of Reading Disability," *Journal of Educational Research*, XXIX (February, 1936), 449–459.

vision in several measures of school success. The numbers in this table indicate the percent of the pupils in each specified group. For example: 65% of the boys with defective vision were above normal for their age and grade in fundamental school subjects as measured by the Progressive achievement test and 35% of this group was below normal.

A careful study of the data presented in this table indicates that there is no significant difference in school success between the average of pupils with defective vision and the average of those with normal vision. On the composite results of the achievement test battery the boys and girls with normal vision seemed to excel. In the Reading Vocabulary test the boys with defective vision made a slightly better showing than those with normal vision, while the reverse was true for the girls. In the progress through the grades a larger percent of the boys with normal vision than with defective vision were retarded one semester or more.

In general the results shown in tables XIII and XIV would tend to show that school success may not be affected as much by the average type of visual defect found in school pupils as vision is affected by tendency to over strain the eyes in the activities which lead to academic success. However, it must be borne in mind that the figures presented in this paper are averages and do not indicate that the academic achievement of some individuals would not be improved by correction of visual defects.

Stereopsis and Intelligence.—Stereopsis or depth vision, has been considered by some to be the result of a more complicated psychological process than some other visual processes. Because of this a part of this study was

TABLE XIII

COMPARISON OF DEFECTIVE VISION GROUP WITH NORMAL VISION CONTROL GROUP

Factors of Comparison	BOYS		GIRLS	
	Defective 247	Normal 114	Defective 210	Normal 90
1. Average grade placement in school	5. 6	5. 5	5. 8	5. 5
2. Average Reading grade placement	6. 15	5. 7	6. 10	5. 95
3. Average I. Q.	105	107	110	110
4. Biotypes				
a. Manuel	40%	40%	30%	30%
b. Mental	40%	30%	60%	50%
c. Mixed	20%	30%	10%	20%

TABLE XIV

PERCENTAGE COMPARISON OF PUPILS WITH DEFECTIVE AND NORMAL VISION IN ACADEMIC ACHIEVEMENT AND SCHOOL SUCCESS

Items of Comparison	BOYS		GIRLS	
	% Defective	Normal	% Defective	Normal
1. Composite Achievement in school Subjects				
a. Above Normal	65	69	82	86
b. Below Normal	35	31	18	14
2. Standard Achievement in Reading Vocabulary				
a. Above Normal	71	70	80	89
b. Below Normal	29	30	20	11
3. Standard Achievement in Reading Comprehension				
a. Above Normal	70	69	86	87
b. Below Normal	30	31	14	13
4. Progress Through School Grades				
a. Normal (no failures)	77	69	83	86
b. Retarded (1 or more semesters)	19	25	9	8
c. Accellerated	4	6	8	6

devoted to the job of ascertaining the amount of correlation between "Stereopsis" and the "Intelligence Quotient" as measured by the commonly used intelligence tests. Two hundred (200) cases were selected with various degrees of perfection in stereopsis as measured by the Betts' Tellibinocular machine. These were correlated with the intelligence quotients secured from the school record cards of the same students. The stereopsis range was from 0% to 100%. The I.Q. range was from 60 to 159. The average stereopsis level of the girls in this group was found to be 92 and the average I.Q. to be 110.7. The average stereopsis level of the boys in this group was found to be 89.7 and the average I.Q. to be 105.7. The coefficient of correlation was obtained by the product moment method for boys and girls separately. In both instances the coefficients of correlation (r) were found to be —.06, which indicates that there was no discernable relationship between the stereopsis and the Intelligence Quotients of the elementary pupils examined.

PHORIC POSTURE AND ACADEMIC FACTORS

Phoric Posture is the algebraic sum of the phorias or lateral imbalances at the near point and the far point. Esophoria, or tendency to over converge, is taken as minus and Exophoria, or tendency to diverge, is taken as plus in the calculation of the phoric posture.

The academic factors with which phoric posture was compared were intelligence quotient, reading vocabulary and reading comprehension. One thousand cases, made up equally of boys and girls, were used as a basis for this comparison. These students ranged from minus 12 to plus 12 in their phoric posture range. In other words from extreme over convergence or crossing of the eyes to the opposite extreme. Their intelligence quotients ranged from 60 to 159. Their grade placement according to standard achievement tests in reading vocabulary, reading comprehension and total test battery scores ranged from second to eleventh grade.

The coefficient of correlation between phoric posture and each of these other factors ranged between .15 and —.12 which is not at all significant.

SUMMARY AND CONCLUSIONS

On the average, there is no significant difference in general academic achievement, in reading ability or in progress through the grades between pupils with defective vision and normal vision.

There is no significant correlation between stereopsis or Coordination Level and Intelligence Quotient; between Phoric Posture and Reading Vocabulary; between Phoric Posture and Reading Comprehension, or between Phoric Posture and composite achievement test scores.

Finally, on the average, there is very little, if any general relationship between normal or defective vision and scholastic achievement. On the contrary it appears that defective vision may be the result of excessive or improper use of the eyes in reading and other similar mental activities. However, nothing in this study proves that many students with defective vision would not be still better students if their occular defects were corrected. To determine this, a study would have to be made of students before and after occular defects were corrected.

AN EXPERIMENT WITH DEMOCRATIZED EDUCATION

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Editor's note: There has been much discussion of "new" education practices. The author presents the results from one school in which he gets results favorable to a democratized procedure.

CONVINCED that any effective campaign for the improvement of education demands demonstration in practice as well as exposition in theory, the author of this article sought a high school to serve as an experimental and exemplification center for his philosophy of education.[1] It was our hope that we might set up for the conscious implementation of a definite philosophy of education first one, and later a half-dozen, typical public school systems of our state from which the gospel might spread by imitation and contagion. Bedford, a borough of 3,300 inhabitants in southern Pennsylvania, 80 miles from State College, worked with us on the project. The supervising principal of this system had obtained his doctorate in part under my direction and he and his staff were willing to cooperate in a manner that would seem typical of the small school systems of our state. The Pennsylvania State College has no demonstration school, and the chief object of this experiment was to learn whether it is feasible to make effective experimental and demonstration centers out of *typical* public schools while they continue to operate wholly under local authority and while they proceed under all the limitations which obtain in the average community. A second object was to get measured evidence of the comparative effectiveness of the "democratized" technique as against the conventional high school procedure. This was, however, a subsidiary object, because the evidence already at hand on this issue is fairly conclusive and could be strengthened only a little by this small-scope trial. The measurement of comparative effectiveness was taken primarily for the satisfaction of the local participants.

A section of 38 freshmen pupils was assigned for the experiment, with the understanding that the project would continue through the four years of their stay in high school. Most of these pupils were from the rural district

[1] The theory set forth in the author's *Curriculum of Democratic Education* (McGraw-Hill Book Company, 1942), the theory popularly called "Progressive Education" with special effort to synthesize the child-centered motif with the motif of systematic direction toward the meeting of social needs. The school here described is the one referred to on page 69 of my book.

surrounding the borough, transported by bus, and were what would customarily be called "non-academics". Although our plan called for a few broad periods each day instead of the conventional "hours" and "subjects", it was necessary to compromise on the latter so as to fit into the regime of the school. Four teachers of the regular staff taught the experimental group as one section, parallel to other sections of non-experimental pupils. In addition to these four segregated classes, the experimental pupils mingled with others in the assembly, in the art class, and in other minor activities. None of the teachers assigned to the experimental group had been specially trained for this type of teaching, although all of them had general professional training. Thus the set-up was about the average that would be obtained largely at random in Pennsylvania high schools of the smaller districts.

Before the launching of the experiment the author gave to the school staff three or four lectures on his philosophy of education. During the early course of the experiment he and his assistant visited the experimental classes each week or two, and later at longer intervals, and counseled with the teachers about their procedures in relation to the fundamental philosophy of education. In this process of supervision the teachers were encouraged to fumble for *their own* techniques, keeping their minds on the ends they were wishing to attain and on the fundamental principles of their philosophy of education; to give them ready-made "units", or rules of procedure, would be merely substituting one bit of mechanism for another—and "mechanism" does not fit the spirit of "Progressive Education". Teachers and pupils were cooperatively and creatively to make their own way as they went.

In the outcome of the experiment as far as our main object was concerned, we experienced some success, but by no means 100 per cent. Two of the teachers stayed with the experiment only one year, and within that time got into the swing of it only partially. In the field of English there were three changes of teachers, over the selection of which the experimenter did not have control, so that there could be little consistency in the work and little cumulative skill. Only in the social studies did the same teacher stay through. She found her way more and more successfully as time went on; and both our observation and the measured outcomes stated later showed that she had good success. The technique is slowly spreading to other teachers in the school system and has had some influence upon other teachers in the community. But the effect has not been nearly as dynamic as we had hoped, due to the relative feebleness with which the limitations permitted

the experiment to work out. In consequence of our experience, it is my present belief that a school system that is merely "willing" to cooperate but goes ahead under local autonomy is not a very promising place from which to try to leaven a community with pioneering educational ideas. If a school in the field is to serve as a university's demonstration school, the university must have control over the selection, assignment, and training of the teachers; and over the scheduling of pupils and other administrative features. This it is likely to have only if it subsidizes rather heavily the school district, assuming part of the salaries of the teachers and providing scholarships for their further training in service. Such subsidized and controlled school systems spread out over a state would seem to be a more effective means of promoting pioneering education than even campus demonstration schools. But in the absence of the control that can ordinarily come only with subsidization of schools in the field, I judge the campus school to be our present most effective means—plus, of course, free-lance "pioneering" schools, which are now comparatively few but immensely potent.

Comparative achievement of the experimental group and control groups was measured largely for the satisfaction of the local participants, but the results were sufficiently clear-cut to justify reporting them here. The experiment was not as well controlled as it would have been if this comparison had been the main objective; but more rigid controls would not have substantially changed the findings. For purposes of comparison the groups were equated on the basis of IQ's derived from The Pintner General Ability Tests, verbal series, Advanced Test, Form A, administered at the opening of the experiment.[2] At the end of the first year, comparison was made on the Kniss Test of World History, on the Wrightstone Scale of Civic Beliefs, on the McCall School Practices Questionnaire, and on the McCall Comprehensive Achievement Test. On the factual knowledge section of the Kniss test the experimental group, when mean attainment was adjusted for difference in means of IQ, was slightly inferior to the control, but the difference was not statistically significant (standard error ratio, 1.66). On all the other five parts of the test the experimental group excelled the control by differences that were very substantial in magnitude and statistically significant, the

[2] The equating was done by the regression technique (a form of analysis of covariance) described by me in the *Journal of Educational Research* for April 1, 1941, pages 606–612; and in the McGraw-Hill edition of Peters and VanVoorhis, *Statistical Procedures and Their Mathematical Bases*, pages 463–469.

standard error ratio (t) reaching 3.63 on the part testing "tying past and present together", 5.4 on the part involving interpretation of cause and effect, and 6.7 on the part involving dealing with "problems of life" in the light of history, whereas a t ratio of 3.0 is considered high and one of 2.00 satisfactory. In general, the experimental group exceeded the control by a larger margin to the extent to which the test measured abilities to interpret and apply history rather than merely memorization of factual materials. The experimental group also exceeded the control by a highly significant difference in "liberalism" as measured by the Wrightstone test. According to the responses that year on the McCall School Practices Questionnaire, the experimental group likewise excelled the control in desirable social behaviors, the mean adjusted score of the former being more than twice that of the latter, a difference that was 6.1 times its standard error. On the McCall Comprehensive Achievement Test the difference was not significant.

At the end of the senior year the confusion resulting from the destruction of the high school building by fire, and the absence of supervision due to restrictions on automobile travel, prevented our getting very full comparative measures. But on the Cooperative Social Studies Test the experimental group surpassed the norms of the test by a difference of moderate significance; and, on the Progressive Education Association tests of reading comprehension with social science content the experimental group exceeded the local control groups by substantial differences which also reached moderate statistical significance. Our most direct test of behavior, a "guess-who" test described below, did not permit of inter-group comparisons because it could not be administered in mixed classes, as its nature required. But direct observation of the pupils in action—which is anyway the most valid type of test—showed unmistakably that the pupils of the democratically conducted group were far superior to pupils of their age in high schools conventionally operated in: initiative, sense of responsibility, resourcefulness at self-help, abilities to talk convincingly about social matters, and healthiness of interest in school work. These findings are in substantial agreement with those of other investigators: that pupils taught by the so-called "progressive education" methods are not inferior to others in the conventional academic masteries and are superior in initiative and in abilities to solve vital life problems in the areas of their training.

A truly valid measure of the effectiveness of an educational program must be in terms of *behavior*, socially useful behavior; tests of academic

information largely miss the point. In connection with this study we attempted that kind of measurement and obtained some evidence on the reliability of the "Guess-Who" type of test, and the relation of the behaviors measured by it to other functions, which is worth reporting. The test contained 29 propositions of which the following are samples:

There are some members of this class who feel responsible for the success of the class, in such matters as good discussion and reports, good reputation of the class before the school and community, etc. Who are they?

Some of the members can express themselves convincingly, so that other pupils are won by their statements or arguments. Who are they?

Other members carry little conviction when they speak; are not impressive: do not convince or persuade others. Who are they?

Some of the pupils are tolerant of the opinions of others; they criticise other people's views with respect. Who are they?

These propositions were classified under five broader behavior patterns:

1. Feel responsible for the success of the group.
2. Manifest leadership.
3. Have an interest in learning and make progress in learning.
4. Are cooperative, orderly.
5. Are tolerant, courteous, considerate of others.

The number of nominations each pupil received as an aggregate under each of these types was taken as the index (score) of his behavior in that trait. By correlating the scores derived from the first chance half of the nominating papers with those of the second half we could get much needed evidence on the reliability of the Guess-Who type of test. The reliability coefficients thus determined ran from .830 in the case of trait 5 to .978 in the case of trait 2, with a median of .942. This probably represents the reliability coefficients for this type of test at their best, because these pupils knew one another very well and had much opportunity to observe the traits estimated. The traits inter-correlated with one another from +.438 to +.901, showing either halo effect or a spread of an integrated character pattern into a number of manifestations, or both. The behavior traits correlated with IQ from +.315 to +.472, and with scores on the Kniss test of World History (made three years earlier) from +.335 to +.618. Even when IQ was held constant there still remained a substantial positive correlation between the behavior traits and the Kniss scores, the partial r's running from +.183 to +.561 and averaging .37.

AN OUNCE OF PREVENTION IN READING

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Editor's note: Reading is an important activity at all grade levels. The author believes that better results could be achieved if the basic approach be changed; possibly not so much remedial work would then be necessary.

I

IN THE last decade certain new concepts concerning the teaching of reading have been gaining widespread attention. Diagnosis, remedial teaching, corrective teaching, reading readiness, and preventive teaching have come in for their share of attention. All of these ideas have developed because basic reading instruction has failed to teach many children to learn to read. In some schools as many as 40 per cent of children have failed in beginning reading. Some experts estimate that 20 per cent of the children in our schools are handicapped in reading, or read below their expectancy. If this is true, isn't it time that we reconstructed our basic programs to take advantage of what has been learned in the clinics and laboratories?

The idea of diagnosis, and remedial or corrective teaching at first received widespread acceptance. But recently school executives have become somewhat alarmed at the reaction which has been met in some quarters. Why the failure in basic reading? Are teachers not expert enough to prevent this waste of human time and energy? Have we become so enamored of the new terminology and of the idea of clinical procedure copied from medical science that we have forgotten that prevention is far more to be desired than cure?

There are signs that already some effort is being made to incorporate into basic reading programs the best practices that have been developed in the clinics and laboratories and to make them an integral part of basic reading. In this article I shall try to point out what these practices are and to show how they can be used so that preventive teaching rather than corrective or remedial teaching will become the watchword in the future. There is no reason why 40 per cent of first graders in some schools should fail in reading, nor why 20 per cent of our elementary school children should be handicapped or retarded. Our business is not to close the door after the horse is stolen, but to lock the door beforehand so that the thief will be thwarted.

The first fruits of the diagnostic movement which have great promise as a preventive measure in basic reading instruction is the concept of readiness. Already most modern basic systems have made some provision for readiness testing and the development of readiness at the school entrance level. But as long as there are definite periods of transition from one grade to another, and from one division of the school to another, we must think of readiness not only at the "Readiness Period" but also at every stage of transition when children are moved from one level of development to another. At present, this seems to be at every grade level in most schools. The practice of promoting children without providing for continuous development is responsible for a great deal of failure in reading.

It would appear obvious that unless the child is ready at each stage of growth to proceed to the next, reading retardation and failure are sure to develop. Those attitudes, interests, abilities, and experiences which make a child ready to read are the basic abilities which enable him to make progress in reading. It does little good to survey children for readiness at the beginning reading level and then to look no farther beyond. Continuous progress in reading depends upon many factors the most important of which are verbal intelligence, physical fitness, language experience and aptitude, interest in reading, training, and adjustment of the task to the capacities of the children.

In the following pages we shall try to show how to prevent reading retardation and disability by incorporating into the basic program measures which will prevent retardation from occurring and therefore secure continuous growth. This is and has been the important function of a basic reading program. In the past we have lacked ways and means of doing it. Now there seems to be enough knowledge and technique available to make it a reality.

II

First, we must take into account the fact of individual differences in native capacity for learning to read. It is generally recognized at present that if we wish to insure success in learning to read, the child should have a mental age of six or six and one-half years at the initial period in the first grade. Yet we seem to forget that the mental age of children varies at every chronological age and that children vary in rate of learning according to mental capacity or native intelligence. We fail then to provide for different

rates of learning and for different levels of achievement. A group of children all having the same mental age at the beginning may vary in chronological and social age as much as three to five years. We refuse to face this fact and persist in believing that we can increase the achievement of the slow learner and thus make him equal to the fast learner. As a result at every grade level we find children in the same class who vary as much as five grades in reading achievement. Unless we are willing to face the facts and prevent disability by providing for continuous progress according to ability, we shall continue to worry over the retarded student and vainly attempt to "bring him up to grade" through futile programs of remedial reading. The way out would seem to be to provide in our basic reading programs for sequential reading programs for children of at least three types: slow learning, average, and fast. While there will still be differences in these groups, with good teaching, we should be able to prevent frustration on the part of many children and secure reasonably continuous progress to the limits of capacity. The only other way out, is individual instruction and we do not see the way clear for that at present. By facing squarely the fact of individual differences and making intelligent provisions for them, we may thus prevent through the reorganization of our basic reading programs much reading retardation, disability, and consequent unhappiness among both children and teachers.

We should recognize that the concept of retardation should be revised. A child is retarded only when he is making progress below his capacity. If his capacity is low, that should require adjustment in the load rather than failing the child. Our objective should become that of having every child work up to his capacity. This requires a frank facing of the need for curricular adjustment and a new philosophy. It is the duty of the school to teach each child to read to the limit of his capacity. When that has been done the school is doing all it can do.

III

Another preventive measure which should do much to alleviate undesirable conditions, is attention to the physical equipment of children for reading. Reading clinics have led the way in this direction. There are now available effective devices for measuring vision, hearing, speech defects, language development, and motor coordination which may be adopted for use in basic reading programs and be the means of preventing retardation and

failure. Instead of allowing children to attempt to learn to read without knowledge of their visual, auditory, and speech-motor equipment for it, we should adopt at once a program of testing which will screen out those children who have visual, hearing, speech, or motor defects which interfere with learning to read. If it is impossible for individual schools to equip for such testing, centers where such testing may be carried on for those children who are suspected to have weaknesses should be established in every county and every city. Money spent on such equipment and on the necessary service would in the long run be returned to the schools through the lessened expense of teaching retarded pupils over and over again.

If adequate tests are made at school entrance those children who have handicaps which prevent their learning to read in the normal way can at once be provided for through special classes for the handicapped or by means of other measures which will be helpful in ameliorating their difficulties. And since children may transfer from one school to another, records of physical measurements should be sent with them. Periodic rechecking of those children who may have developed defects which were not detected at school entrance should be made.

It seems indefensible for us with the knowledge we now possess to continue to allow children with physical handicaps to struggle and fail without skilled attention to their needs. This attention should not be sporadic, nor should it be given after the child has struggled and failed. It should be a preventive feature of our basic reading program and be routine in character.

IV

A third measure which should be incorporated in basic reading programs as preventive, concerns the child's language development. The medical examination of the child should reveal the presence of possible structural defects in the speech organs which interfere with language growth. Such children are problems for the physician, the speech expert, and the speech clinic. But far more common and perhaps more significant is retarded language development due to lack of intelligence, poor environment, and training, which condition the child's success in learning to read.

Teachers are generally aware of the fact that children from homes in which parents speak a foreign language or broken English, in which conversation, story-telling, and reading are at a minimum, are hard to teach

to read. They do not always realize that there is a wide gap between the language development of these children and the language they are required to learn in order to learn to read. Teachers' lack of training in language and speech is responsible for their inability to cope with this problem.

At school entrance children vary widely in their knowledge of words, their speech habits, and their ability to think in words and sentences. This is due to the garbled and incorrect speech forms which they hear, restricted vocabulary in their homes and community, lack of ear training, lack of ability to make English sounds correctly, and lack of practice and experience in connected speech. They are simply not equal to even the simple language of first year reading. Unless they receive adequate training, they will be handicapped in learning to read for some years to come. Such children need speech training and language development before they undertake the task of learning to read. The natural way of giving such training is to incorporate it into the basic reading program, since it is naturally integrated with reading, and is not likely to be given elsewhere.

Even normal children at school entrance need auditory and speech training as well as training in visual discrimination. Some basic systems have given attention to ear training and training in pronunciation, phonetic analysis and fusion, but seldom is such training adequate. In our reading laboratory we find that over half the cases are suffering from language difficulties. They can neither recognize nor pronounce correctly fundamental speech sounds. This retardation in speech development is directly responsible for their failure to become independent readers.

In recent years the school's concern with thoughtful silent reading has caused many to forget that reading is language. Basically, reading is a process of identifying a symbol as representing a sound made by the human voice to which we have attached meaning. The child's first experience with language is auditory and speech-motor. Unless he has heard word sounds correctly, he cannot make them correctly. He cannot then make the transition from the auditory to the visual, which, as Dolch points out, is one of the characteristic adaptations which the child must make in beginning reading.

In their haste to develop thoughtful silent readers, some have forgotten that the natural development in reading is to make a gradual transition from outward speech to inward speech. There is a gradual change from seeing a word and saying it to seeing a word, thinking its meaning with accompanying inner speech which echoes the auditory image of the word and is accompa-

nied by speech-motor response in an abbreviated form. The normal individual learns to read faster silently than orally during the period from the first to the fourth grade and comes to read silently for his own pleasure or advancement by that time.

But this does not mean that oral reading is not important nor that it should be repressed in favor of silent reading. In the over-emphasis upon oral reading of the nineteenth century certain evils arose, but in the reaction against it in the present century, the pendulum has swung too far. Many have failed to provide beneficial training in oral reading and speech which is basic to development in silent reading. In the days of the *Columbian Orator* boys and girls learned to declaim the rousing lines of Patrick Henry and those of other American patriots. Some of these were undoubtedly over their heads and were learned by heart rather than read. But there are some who think that reading would be more accurate, more meaningful, and more profitable if children were still taught to read better orally. They would gain accuracy and grace in speech, improve their vocabularies, and learn to enjoy better the music of poetry and the measured strains of the prose stylists, if they could read them aloud effectively. Choral reading and audience reading provide a means of socializing children which has recently begun to receive new emphasis.

As a preventive measure, therefore, we should incorporate into our basic reading programs adequate attention to speech, language growth and development, and oral reading, especially at the beginning, in order that the children may not lack that fundamental mastery of language which is essential to the later development of fluent silent reading. The emphasis should not lead to the errors of the past, but it should strengthen the teaching of reading at certain points where it has been weak in recent years.

V

A fourth measure which should greatly strengthen our basic reading programs and prevent retardation and disability in reading is that of closing the gaps in the child's fundamental reading skills, particularly in the mechanics of recognition. Case studies of children in the laboratory under the direction of the writer, now several hundred in number, show that the majority of retarded readers suffer from lack of basic skills. Many of them are wholly dependent on sight reading. They must know a word by heart or

they cannot read. They have neither the power of visual analysis nor of phonetic analysis and synthesis. Without independence in recognition, they neither can nor do read unless they are required to do so. All but the very dullest children improve greatly in reading when they are given specific training in word recognition.

Without entering into the controversy concerning phonics, or the relative values of teaching visual analysis, phonetic analysis and fusion, and use of context in recognizing new words, it may be said that our experience shows that the difficulties of the children are specific, but that retardation in reading is common because children fail to learn independent recognition skills which many of them are able to learn when they are specifically taught. This suggests that either the techniques now advocated are too complex for teachers and children to use, or that those techniques which are advocated in basic systems are not thoroughly taught. As suggested before in this paper, the cause of this inadequacy may be the practice of promoting children from one grade to another before they have developed certain skills and to the lack of provision for continuous development. It would seem, therefore, that basic systems should adopt as a preventive measure programs which would insure the child against failing to learn essential skills. The main requirement is that whatever the techniques that are taught, they should be taught so *that they work*. If this were done, we should soon find that many of our difficulties would disappear.

VI

In their attempts to remedy the defects that they have discovered in the diagnosis of reading disability, workers in the clinics and laboratories have found that no progress could be made until they discovered the child's reading level and found materials which he could and would read. The idea that materials of reading in the past have been too difficult has led to the present movement toward the simplification of reading materials. Obviously basic systems which are too difficult for the average or lower child in a grade may cause reading retardation and failure. As a preventive measure some think that the way out is to simplify the reading materials. Hence, the present interest in multiple book series. While in general the idea of easier reading sequences has merit and is based upon sound principles, in practice there are certain dangers that should be avoided. The multiplication of books is not necessarily the answer to the prevention of reading retardation and failure.

As has been pointed out earlier in this paper, the fact of individual differences suggests the need for different reading sequences for children of different capacities. But it does not indicate that easier sequences are necessary for either the average or rapid learner. And since the easier sequences generally result in restricted vocabulary, the result of the use of easier sequences with average and fast learners may be to retard their maximum growth in reading rather than to increase it.

There is danger, too, of assuming that three little books are easier than one larger book which has almost identically the same number of different words and the same number of running words as the three easier books. Should a multiple book series with a preprimer which contains 20 different words in 400 running words be followed by another which contains 30 additional new words in 600 running words, and by still another with 25 different new words in 500 running words, the effect would be the same as if the 75 different words were contained in a preprimer of 1500 running words, if in other respects the books were well-made; yet the teacher might assume that one series was easier than the other. In order to be easier one series would have to multiply its length, or the total of its running words.

Another fallacy which teachers fall into is that of assuming that if they use seven different preprimers, they have thereby provided an easier sequence in beginning reading than if they used another series in which a preprimer and a primer provided practically equal amounts of experience. In a certain city the practice is followed of teaming up seven preprimers which when analyzed show a total vocabulary of 265 words with an average repetition of around 12 plus. This team of preprimers is actually harder than a well-constructed basic series in which the primer and preprimer teach 232 different words with an average repetition of 32.5, assuming that in other respects the books are well-made.

Nevertheless, the effort to build sequences that are better suited to teaching basic reading to children of different capacities is a laudable practice in basic reading and will lead to the prevention of reading failure and disability when accomplished. One way to accomplish this end is to team up specific preprimers, primers, and readers into easy, average, and high level sequences. In order to do this teachers need to learn how to catalog the contents of readers and how to analyze them for at least vocabulary content. Studies of the vocabularies of readers always show wide variability and a small number of words used in common by any given group of books, yet some of the

books are more related than others. The teacher should know how to select the related books so that they will team up into a desired sequence. It is possible that so-called supplementary reading is successful chiefly among the brighter children and that for the duller it only increases the difficulty.

If teachers will learn the simple techniques of vocabulary analysis and will plan sequences for children of different rates of learning, undoubtedly a great deal can be done to prevent failure among the slow learners. These sequences should be planned and used until bright children have reached independence, but for those who are retarded because of native capacity adjustments will have to be made throughout the elementary and junior high schools at least. In general it may be assumed that the makers of books for children have succeeded quite well in developing a sequence which the upper fifty per cent of an average class can use with profit. It is with the lower fifty per cent that the difficulty lies.

Another equally fallacious assumption is that a book is easier for children if it contains only words and one line sentences; but that if sentences run over the line, it thereby becomes difficult. Some fail to remember that the purpose of teaching to read is to develop among children the ability to read interesting, connected material at their own level and that the sooner they can learn to read material which is normal in form, sentence length, and other respects the better. Language development is progressive. Unless the child has an opportunity to read longer sentences and to learn new words, he cannot make progress in reading.

VII

Another direction in which prevention of retardation and failure lies is in the integration of basic with curricular reading. For years reading specialists have pointed out the desirability of bringing about a closer relationship here. How much failure in subject schools, or in activity schools is caused by inadequate reading ability is shown by the widespread complaint that children cannot read their textbooks or reference books. It will do little good, however, to complain about this problem unless measures are taken to develop a comprehensive reading program which will take care of the child's various reading needs. Already a movement is apparent to simplify textbooks. This will help a great deal, but the problem will not be solved until those responsible for basic reading instruction persuade teachers generally to develop an integrated program in which core vocabularies are determined,

the difficulty of books appraised, and an adjustment made so that, insofar as possible, children will have an opportunity to develop the power to read books in the curricular fields.

This will undoubtedly require that in the future teachers learn how to select textbooks adapted to the needs of their pupils, somewhat as suggested for the development of sequences in reading. The acceptance of new techniques for grouping pupils and for teaching them around important centers of interest with materials of varying levels of difficulty will be necessary if the maximum good of each child is to become the slogan of a democratic school system.

VIII

The theme song of this article might well have been "an ounce of prevention is worth a pound of cure." Basic reading instruction must be more carefully planned and organized so that reading retardation will gradually disappear as a school problem. When the facts of reading research are used and the results of the laboratory and the clinic are reviewed for ideas, it seems that there is enough available knowledge to enable us to develop a program in which it is recognized that continuous growth to the limits of his capacity, uninterrupted by frustration and failure which might have been prevented, is all that we could desire for the individual child.

KINDS OF ERRORS IN DIVISION OF DECIMALS AND THEIR CONSTANCY

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Editor's note: One of the several areas to which research techniques have been applied with success is that of arithmetic. The author presents an analysis of errors in the division of decimals.

A PREVIOUS study by the writer[1] showed the relative difficulty of different kinds of examples in division of decimals as measured by the number of errors made on each type of example. The study here reported classifies the different kinds of errors made in division of decimals and determines the persistence or constancy of these errors.

In the study cited, about two hundred students in Grades VI–IX, inclusive, took a test in division of decimals which included all of the inherent difficulties of the process. There were four forms to the test. These four forms may be illustrated by the example, $3.6\overline{)27}$. On the first form, the example was written $36\overline{)2700}$; on the second form the example was written $3.6\overline{)\begin{matrix}75\\27\end{matrix}}$; on the third form the example was written $27 \div 3.6 = 75$; on the last form the example was written $3.6\overline{)27}$. In each case the pupil had to complete the division and supply the missing decimal points. Since the first form did not deal with decimals, the results from that test are not considered in this study. For the function of each form and the test used in the investigation, the reader is referred to the article mentioned. In this article, it was shown that no measure of intelligence or of any other factors such as insight and understanding of the process was made. The students sampled, learned the topic of division of decimals from the conventional presentation.

There are four kinds of examples in division of decimals. These are: (1) dividing a decimal by an integer; (2) dividing two integers with a decimal in the quotient; (3) dividing an integer by a decimal; and (4) dividing a decimal by a decimal. The same kind of error may occur on two or more of these kinds of examples and on each of the three forms of the test. Including the errors on the first form in division of whole numbers and the duplications of the same error on different parts of the test and on

[1] Grossnickle, Foster E. "Types of Errors in Division of Decimals," *Elementary School Journal*, XLII (November, 1941), pp. 184–94.

the three forms, there were ninety-eight kinds of errors reported. Since many of these errors were duplications, they were all combined into twenty-one different kinds of errors.

Brueckner[2] made an analysis of errors in division of decimals from more than three hundred pupils in Grades VI, VII, and VIII. He grouped sixteen (3 not considered) kinds of errors under three major classifications. Brueckner placed about 70 per cent of errors under the classification "difficulties peculiar to decimal situations". His description is too general for usage in this study.

The twenty-one kinds of errors reported in this study are grouped under five classifications. These errors were made by one hundred pupils selected at random from the approximate group of two hundred students who took the test in each of four grades. The classification and kinds of errors with their frequency are shown in Table I.

[2] Brueckner, Leo J. "Analysis of Difficulties in Decimals," *Elementary School Journal*, XXIX (September, 1928), 32–41.

TABLE I

CLASSIFICATION AND KINDS OF ERRORS MADE BY 100 STUDENTS IN DIVISION OF DECIMALS IN GRADES VI–IX

Classification and Description of Error
I. Errors Resulting from Placement of Point
1. Omitted point in quotient
2. Omitted point in both dividend and quotient
3. Placed point in dividend in wrong place
4. Pointed off places in dividend to left
5. Placed point in quotient as if divisor were an integer
II. Errors Resulting from Shifting of Point
6. Shifted when divisor was an integer
7. Shifted correctly in dividend, point wrong in quotient
8. Shifted places from left of dividend instead of from right
9. Shifted incorrectly (number of places)
10. Shifted to left in dividend
III. Errors Resulting from Zero
11. Omitted zero before first quotient figure
12. Prefixed too many zeros before first quotient figure
13. Annexed zero to quotient when not needed
14. Annexed too many zeros to dividend
15. Did not annex needed zeros to dividend
IV. Errors Resulting from Combinations
16. Incorrect estimation
17. Incorrect multiplication
18. Incorrect subtraction
19. Incorrect usage of zero
V. Miscellaneous
20. Did not use the quotient figure given
21. Placed first quotient figure incorrectly
Total
Mean Number of Errors per Student

TABLE I—Continued

	Grade VI		Grade VII		Grade VIII		Grade IX		All Grades	
	Number of Errors	Per Cent of Total	Number of Errors	Per Cent of Total	Number of Errors	Per Cent of Total	Number of Errors	Per Cent of Total	Number of Errors	Per Cent of Total
I.	1142	46. 7	686	43. 6	1118	41. 4	1740	35. 0	4686	40. 0
	146	6. 0	71	4. 5	118	4. 4	286	5. 8	621	5. 3
	252	10. 3	144	9. 2	310	11. 4	454	9. 1	1160	9. 9
	55	2. 2	45	2. 9	118	4. 4	265	5. 3	483	4. 1
	16	0. 7	13	0. 8	15	0. 6	98	2. 0	142	1. 2
	673	27. 5	413	26. 2	557	20. 6	637	12. 8	2280	19. 5
II.	887	36. 2	465	29. 5	967	35. 6	1304	26. 3	3623	31. 0
	33	1. 3	59	3. 7	174	6. 4	267	5. 4	533	4. 6
	0	0. 0	28	1. 8	31	1. 1	59	1. 2	118	1. 0
	773	31. 6	294	18. 7	647	23. 9	685	13. 8	2399	20. 5
	81	3. 3	73	4. 6	104	3. 8	248	5. 0	506	4. 3
	0	0. 0	11	0. 7	11	0. 4	45	0. 9	67	0. 6
III.	195	7. 9	178	11. 3	172	6. 3	1238	24. 9	1783	15. 1
	116	4. 7	135	8. 6	136	5. 0	517	10. 4	904	7. 7
	51	2. 1	22	1. 4	22	0. 8	536	10. 8	631	5. 4
	5	0. 2	11	0. 7	10	0. 4	14	0. 3	40	0. 3
	8	0. 3	7	0. 4	0	0. 0	12	0. 2	27	0. 2
	15	0. 6	3	0. 2	4	0. 1	159	3. 2	181	1. 5
IV.	163	6. 6	159	10. 1	277	10. 3	428	8. 5	1027	8. 8
	70	3. 0	84	5. 3	123	4. 5	185	3. 7	462	4. 0
	32	1. 3	27	1. 7	56	2. 1	77	1. 5	192	1. 6
	16	0. 7	11	0. 7	29	1. 1	61	1. 2	117	1. 0
	45	1. 6	37	2. 4	69	2. 6	105	2. 1	256	2. 2
V.	63	2. 6	87	5. 5	174	6. 4	264	5. 3	588	5. 1
	12	0. 5	11	0. 7	9	0. 3	69	1. 4	101	0. 9
	51	2. 1	76	4. 8	165	6. 1	195	3. 9	487	4. 2
	2450	100. 0	1575	100. 0	2708	100. 0	4974	100. 0	11707	100. 0
	24. 5		15. 8		27. 1		49. 7		29. 3	

The description of the errors in Table I is clearly indicative of the operation except in No. 4 and No. 10. No. 4 can be illustrated by the example $1.6\overline{)264}$ (a whole number divided by a decimal). In this type, the student wrote the example $16\overline{)26.4}$. In No. 10 the student shifted to the left in the dividend when a decimal is divided by a decimal. The point in the example $.51\overline{)107.1}$ was incorrectly shifted in the dividend so that the example became $51\overline{)1.071}$.

Table I shows that many more errors were made in Grade VIII than in Grade VII and many more in Grade IX than in Grade VIII. Division of decimals to these students was first taught in Grade VI and then retaught in Grade VII. Of course the topic was reviewed in Grade VIII but in Grade

IX algebra was taught. If the sampling used in this study is representative of the ability of ninth grade students, it is evident that more or better teaching of division of decimals is needed in the advanced grades.

Although the number of errors in each grade varied, the per cent of errors in each classification was quite uniform through the four grades. The small percentage of errors resulting from combinations indicates that those abilities and understandings which are peculiar to division of decimals are the chief cause of error in this process.

Table I shows that forty per cent of errors resulted from No. 5 and No. 8. The examples, $.4\overline{)12}$ and $.4\overline{)1.2}$, both illustrate No. 5. The point in the example $1.6\overline{)264}$ was shifted in such a way as to make the example equivalent to $16\overline{)2.64}$ so as to represent Error No. 8. This form of error was possible when an integer was divided by a decimal. If No. 2 is added to the two other kinds of errors mentioned, about fifty per cent of all errors are accounted for by these three kinds. Error No. 2 could occur when two integers are divided with a decimal in the quotient. The example $75\overline{)6}$ was changed to $75\overline{)600}$ to represent this kind of error.

It is significant that forty per cent of all errors in division of decimals result when the divisor is a decimal and the dividend is an integer or when both are decimals. In each case the student did not know how to treat the divisor when it is a decimal. This would seem to indicate that the student should be adequately instructed in how to make the divisor an integer. Then the dividend would be either an integer or a decimal. The solution of either of these forms is very easy as shown by a previous study.[8]

CONSTANCY OF ERRORS IN DIVISION OF DECIMALS

An error is either sporadic or persistent. Chance errors are sporadic and constant errors are persistent. It is necessary to know if errors are constant or due to chance in order to make a reliable diagnosis from the result of a test. This study shows the constancy of the errors made in division of decimals.

Considerable scientific evidence is available to show that most errors in arithmetical computation are sporadic rather than persistent so that a reliable

[8] Grossnickle, Foster E. *Op. cit.*, p. 190.

diagnosis cannot be made from one response.[4] This study further supplements the results obtained from previous investigations.

Previous mention was made to the three forms of the same test used in this investigation. The number of errors made on each form of the test is shown in Table II.

TABLE II

NUMBER OF ERRORS ON EACH OF THE THREE FORMS OF THE TEST

Form	Number of Errors									
	Grade VI	Per Cent of Total	Grade VII	Per Cent of Total	Grade VIII	Per Cent of Total	Grade IX	Per Cent of Total	All Grades	Per Cent of Total
1	934	38.1	513	32.6	920	34.0	1877	37.7	4244	36.3
2	812	33.2	440	27.9	795	29.4	1302	26.2	3349	28.6
3	704	28.7	662	39.5	993	36.6	1795	36.1	4114	35.1
Total	2450	100.0	1575	100.0	2708	100.0	4974	100.0	11707	100.0

Table II shows that the number of errors on each form of the test was about the same. This was true for each of the four grades sampled. For approximate purposes, it can be stated that the number of errors was uniformly distributed over the three forms of the test.

The number of different kinds of errors is shown in Table I. The number of different errors for each student is shown in Table III.

Table III shows that the mean number of different kinds of errors for Grade IX was almost twice as many as for each of the other three grades. The mean number of errors for each kind was found by dividing the mean number of errors in Table I by the mean number of different kinds of errors in Table III. This quotient is almost the same for each of the four grades.

Table II shows that about the same number of errors was made on each of the three forms of the test. Table III shows that the mean number of

[4] Brueckner, Leo J. "Persistence of Error as a Factor in Diagnosis," *Education*, XVI (November, 1935), pp. 140–44.

—— and Ewell, Mary. "Reliability of Diagnosis of Error in Multiplication of Fractions," *Journal of Educational Research*, XXVI (November, 1932), pp. 175–85.

Grossnickle, Foster E. "Constancy of Error in Learning Division with a Two-Figure Division," *Journal of Educational Research*, XXXIII (November, 1939), pp. 189–96.

——. "Reliability of Diagnosis of Certain Types of Errors in Long Division with a One-Figure Divisor," *Journal of Experimental Education*, IV (September, 1935), pp. 7–16.

—— and Snyder, John H. "Constancy of Errors to Basic Facts in the Fundamental Operations in Arithmetic," *Journal of Educational Research*, XXXII (January, 1939), pp. 336–44.

TABLE III

NUMBER OF DIFFERENT KINDS OF ERRORS MADE ON ALL THREE FORMS OF THE TEST BY EACH STUDENT

Number of Different Kinds of Errors	Grade VI	Grade VII	Grade VIII	Grade IX	All Grades
	f	f	f	f	f
16	0	0	0	5	5
15	0	0	0	2	2
14	1	0	1	5	7
13	0	0	1	8	9
12	0	0	0	8	8
11	1	3	2	9	15
10	2	3	5	7	17
9	1	3	5	9	18
8	6	6	10	5	27
7	10	6	5	6	27
6	12	8	7	10	37
5	13	10	12	9	44
4	12	17	21	7	57
3	20	13	15	3	51
2	13	12	10	5	40
1	7	12	4	2	25
0	2	7	2	0	11
Total	100	100	100	100	400
Mean	4.5	4.2	5.1	9.3	5.4
Mean Number of Errors for Each Kind	5.4	3.8	5.3	5.3	5.4

different errors was about the same and that the mean number of errors for each kind was the same. If the same error occurred on each form of the test, then it is certain that the errors made are constant. Table IV shows whether or not the same kind of error was repeated on each of the three tests.

The four kinds of errors in Table I classified under "errors resulting from combinations" could appear only once because of the structure of the three forms of the test. All of the remaining seventeen kinds of errors could appear at least three times. The same error occurred on all three tests in less than ten per cent of the cases for all of the different kinds of errors except the four shown in Table IV.

Each of the four kinds of errors given in Table IV occurred once on each test form except No. 5. In this case the error could occur when the divisor is an integer and the dividend is either an integer or a decimal. There were then six possible chances for errors of this kind on the three forms of the test.

Table IV shows that when the student shifted the point from the left instead of from the right, as in the example $.3\overline{)12}$ to $3\overline{)1.2}$ the errors were constant in about 5 out of 6 times, assuming that at least twice out of

TABLE IV

NUMBER AND KINDS OF ERRORS WHICH OCCURRED ON ALL THREE FORMS OF TEST IN DIVISION OF DECIMALS FOR GRADES VI–IX

Number of Error (Table I)	Grade VI				Grade VII				Grade VIII				Grade IX				All Grades			
	2 out of 3	Per Cent	3 out of 3	Per Cent	2 out of 3	Per Cent	3 out of 3	Per Cent	2 out of 3	Per Cent	3 out of 3	Per Cent	2 out of 3	Per Cent	3 out of 3	Per Cent	2 out of 3	Per Cent	3 out of 3	Per Cent
8	622	80.5	544	70.3	236	80.3	154	52.4	565	87.3	474	73.3	629	91.8	475	69.3	2052	85.5	1647	68.7
	773		773		294		294		647		647		685		685		2399		2399	
6	0	0.0	0	0.0	0	0.0	0	0.0	94	54.0	57	32.8	87	32.6	45	16.9	181	34.0	102	19.1
	33		33		59		59		174		174		267		267		533		533	
3	100	39.7	46	18.3	3	2.1	0	0.0	184	59.4	68	21.9	190	41.9	101	22.2	477	41.1	215	18.5
	252		252		144		144		310		310		454		454		1160		1160	
5	333	49.5	51	7.6	187	45.3	64	15.5	281	50.4	44	7.9	302	47.4	55	8.6	1103	48.4	214	9.4
	673		673		413		413		557		557		637		637		2280		2280	

S. S. Read Table IV: Error No. 8 Table I was made 773 times on all three forms in Grade VI. Six hundred twenty-two of these errors occurred on at least two of the three forms of the test or in 80.5 per cent of the cases. A total of 544 of the 773 errors occurred on all three forms, or in 70.3 per cent of the cases. Read the remainder of the table in the same way.

three possible chances represents constancy. In about two out of three cases the same error occurred on all three forms. In all of the other cases for the entire sampling the same error occurred on all three forms less than one time out of five. (For Error No. 5, two out of three chances means four out of six; three out of three chances means six out of six.) These data show that an error in division of decimals is due almost entirely to chance except when the student shifts the point from the left instead of from the right to divide an integer by a decimal. Since this kind of error is persistent, adequate instruction should be given to enable the student to deal effectively with this phase of arithmetic computation. The writer[5] has elsewhere recommended that a decimal divisor should always be made an integer before completing the solution. This study showed that half of the errors in division of decimals result from a faulty usage of a decimal divisor. In light of these facts, the writer wishes to supplement his previous recommendation that a decimal divisor should be made an integer before the solution is attempted. This conclusion is valid for the upper grades in the elementary school.

SUMMARY

An analysis was made of the errors on a test of division of decimals made by 100 students in each of the Grades VI–IX. Each student took the same test three times although the formats were different. The following results were obtained:

1. There were 21 different kinds of errors which were grouped under five classifications.

2. Forty per cent of all errors resulted from the improper usage of a decimal divisor.

3. The number of errors on each of the three forms was about the same.

4. The average number of errors for each kind of error was about the same in the four grades sampled.

5. An error was considered constant if it occurred on each of the three forms of the test. All of the errors were very spurious except four different kinds. Of these four, only one was constant or persistent. This constant error occurred when an integer was divided by a decimal.

Since the only constant error in division of decimals results from dividing an integer by a decimal, the writer recommends that the student should be instructed to make the divisor an integer before completing the algorism.

[5] *Ibid.*, p. 194.

THE HANDWRITING OF COLLEGE SENIORS

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Editor's note: Should the handwriting of teachers be legible? The author thinks so and finds that the writing of many is not.

MANY time-honored and threadbare professorial jokes revolve about the illegibilities of the handwriting of college students. Professors joke about it; but they have done little to investigate it. There have been numerous studies of handwriting, but few of them deal with the penmanship of college students. There are several commonly held conclusions regarding handwriting that are of significance so far as college students are concerned.

First, it has commonly been assumed that handwriting should be taught only in the elementary school, or, if beyond the grades, only to students in commercial courses for vocational purposes (1).

Second, there has been a reaction against older standards of excellence in handwriting and a tendency to revise standards to meet more reasonable life-requirements. The earlier studies of Koos (4) and of Kirk (3) led to the conclusion that standards of quality should be more reasonable.

Third, there is ample evidence that the handwriting of many persons degenerates as age increases (2, 6, 7). Freeman, perhaps with some humor, says that "most adults who do much writing develop a somewhat original style".

Fourth, the opinion seems to be widely held that teachers ought to write more legibly than adults in many other occupations. Koos (4) says that for "teachers in the elementary schools it will be necessary to insist upon the attainment of a somewhat higher quality" of handwriting than for the general public. Freeman (2) contends that the "teachers' writing probably need not be a copybook style, but it should have at least a reasonable degree of legibility and some beauty". Kirk (3) actually found that "elementary teachers in general write better than high-school teachers; high-school teachers, in turn, better than college professors". However, Kirk also found that the average quality of handwriting of 202 educational workers was excelled by only one other occupation, a small group of housekeepers.

These four generalizations do not exhaust the results of handwriting research. They are, however, the outcomes most pertinent to the present study.

THE PROBLEM

The present study is concerned with these questions:

How well do college seniors who intend to teach write? How fast do they write?

How reliably can the handwriting of the college seniors be judged?

How well do college seniors agree with their classmates and with a handwriting scale evaluation in judging their handwriting?

It should be noted that the handwriting specimens used were secured under test conditions and do not represent writing done under the conditions that most ordinarily obtain when college students write. Sackett is quoted by Starch (8:362) as finding that college students wrote somewhat slower and appreciably better under test conditions, as compared with "normal" conditions.

PROCEDURE

The subjects used in this study were sixteen men and twenty-nine women, all college seniors, in a course in education at a teacher training institution.* These forty-five students differed among themselves greatly as to their fields of professional interest; their teaching fields ranging from art to zoology. However, they were very uniform in the quality of their professional interest; all were seriously determined to be teachers.

The American Handwriting Scale (9), eighth grade test, was administered to the group by the writer. The selection to be written was memorized by the students two days before the test and rehearsed immediately before the test was given. Each student took the test three times, the first time being the initial practice exercise. The writing was done while seated at regular library tables. The student was asked to check the sample of his two test specimens that he thought was the more legible. The student then rated the superior sample according to the seven-point scale used in the test. This scale (excellent, very good, good, fair, below fair, poor, and very poor), was written on the blackboard and the following directions given: "Using the scale before you, please rate your handwriting as to its legibility. No other consideration than the ease with which you can read your own writing should be taken into account."

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At the next class session, two days later, the samples were redistributed to the class so that no student had his own. Each student indicated the sample of the two specimens that he thought the more legible. He was then told which of the two samples the student who wrote it thought the more legible and rated that sample according to the seven-point scale for legibility. These ratings were transferred to tabulation sheets and all evidence of them removed from the original samples. The writer then judged which of each pair he thought better.

One week later the writer rated all samples against the Grade VIII specimens of the scale. These ratings were recorded on separate sheets. After the lapse of another week, the writer again rated all samples. This afforded two "expert" scale ratings of every sample (90 ratings in all). Since each student had written two specimens, on reverse sides of the same sheet of paper, the writer rated the forty-five specimens written first and then reversed the order of rating for the forty-five samples written second. It should be emphasized that these ratings were made against scaled samples of the handwriting of eighth-grade children. This level was selected because no student in the class had had any formal instruction in handwriting after the eighth grade and because it was the highest grade level for which specimens are provided in the scale.

A rate score was secured for each sample by counting the number of letters written in the two-minute test period and dividing this number by two. The rate score is, thus, the average number of letters written per minute.

The data thus secured for each of the forty-five students may be summarized as follows:

a. Two specimens of handwriting secured, one after the other, by the student writing and re-writing a memorized selection of 100 letters for two periods of two minutes each.

b. Judgments as to which of these samples is the more legible were rendered by the student, by one of his classmates, and by the writer.

c. Ratings based on a seven-point scale of legibility of the sample judged by the student to be his "better" one, by the student himself and by a classmate.

d. Two "expert" ratings of all samples rendered a week apart and based on comparison with specimens of the handwriting of eighth-grade pupils which had been arranged by handwriting experts in the order of their quality.

e. Rate scores, average number of letters per minute, for all samples.

THE QUALITY OF SENIORS' HANDWRITING

A summary of the quality ratings of the sample of handwriting judged by the student to be his better sample is given in Table I.

It should be kept in mind that the students rated their own handwriting specimens and those of their classmates only by a subjective judgment of legibility. The writer's ratings were based on careful comparisons with scaled samples of the writing of eighth grade children. It is apparent that:

1. The handwriting of the girls was judged better, on the average, than that of the boys, no matter who the rater was. This finding is consistent with that of Logsdon and Leggitt (5) and of Young (11), although we did not find evidence to support Young's statement that "there are two types of handwriting, masculine and feminine."

TABLE I

QUALITY RATINGS OF THE HANDWRITING OF 45 COLLEGE SENIORS

Rating	By the Student			By a Classmate			By the Writer					
							First Rating			Second Rating		
	Boys	Girls	All	Boys	Girls	All	Boys	Girls	All	Boys	Girls	All
Excellent				1	2	3						
Very good		4	4	2	7	9	2	1	3			
Good	4	13	17	4	17	21	1	3	4	2	3	5
Fair	4	9	13	8	3	11		7	7	1	6	7
Below Fair	7	2	9	1		1	4	9	13	3	11	14
Poor	1	1	2				8	8	16	6	8	14
Very Poor							1	1	2	4	1	5
Total	16	29	45	16	29	45	16	29	45	16	29	45

2. Their classmates judged the students' handwriting as being more legible than the students themselves judged it to be. The classmate raised the self-rating in 24 cases, lowered it in three cases, and gave the same rating in 18 cases.

3. The samples were of below average quality when judged by the scaled samples of handwriting of eighth graders. If "Fair" be taken as an average rating, 69 per cent of these seniors rated below average on the first expert rating, and 73 per cent fell below average on the second rating.

4. The writer tended to lower the ratings slightly on his second rating of the samples.

The average senior in the group rated his handwriting as about "fair", while his classmate would rate it "good". However, when judged against

scaled samples his handwriting received a rating of "below fair". One can only judge from this that, so far as this group is concerned, the average student's handwriting is reasonably acceptable to himself and his classmates but not acceptable according to the standards of the scale employed.

In judging which of the two samples of their handwriting was the better the students showed a decided preference for the sample that they wrote first. This was a three-to-one preference among the boys and a two-to-one preference among the girls. Both their classmates and the writer showed a four-to-one preference for the first sample of the boys' handwriting and a three-to-two preference for the first sample of the girls' handwriting. Similarly the writer's ratings of the samples against the scaled specimens were on the average slightly higher for the first sample. It would seem that the first effort following a practice exercise resulted in a sample of handwriting that was, on the average, somewhat superior to a second sample.

THE RATE OF SENIORS' HANDWRITING

No attempt was made to transmute rate scores into scale values, by the method suggested in the manual of the American Handwriting Scale, since most of these seniors exceeded the maximum rates secured by eighth graders. Table II presents a summary of the rate scores for the 45 college seniors.

TABLE II

SUMMARY OF HANDWRITING RATE SCORES FOR 45 COLLEGE SENIORS

(Letters per Minute)

	Sample I			Sample II		
	Range	Mean	Sigma	Range	Mean	Sigma
Boys	77. 5—152. 5	117. 5	18. 8	78. 5—150. 0	123. 2	16. 5
Girls	100. 0—146. 5	122. 6	13. 0	105. 5—155. 5	129. 5	14. 7
All	77. 5—152. 5	121. 1	15. 2	78. 5—155. 5	126. 7	15. 6

The norm (median) rate for eighth-grade pupils is 80 letters per minute, according to the American Handwriting Scale. If this represents something of a basis of comparison, the college seniors are rapid writers. These average rate scores are very similar to those reported for college seniors by Wixted and Curoe (10). The boys wrote somewhat more slowly than the girls, on the average. The critical ratio of the difference between the

mean scores of boys to the probable error of this difference was 2.2 for sample I and 2.7 for sample II. The boys also had a somewhat greater spread of rate scores than the girls. On the average, these students wrote faster for the second sample than for the first. The critical ratio of the difference between the mean rate scores for all students on samples I and II to the probable error of this difference is 2.6.

While the students tended to increase their rate of writing on the second sample, the correlation (r) between rate scores of the two samples is +.814, P.E. .038. There were negative correlations of varying degree between rate of writing and quality as rated by students and the writer. These coefficients (r's) are summarized below:

r (rate, sample considered by student to be the better, to writer's first rating of the sample) —.459 P.E. .079
r (rate, sample considered by the student to be the better, to writer's second rating of the sample) —.415 P.E. .084
r (rate, first sample, to writer's first rating of the sample) —.365 P.E. .088
r (rate, first sample, to the writer's second rating of the sample) —.498 P.E. .076
r (rate, second sample, to writer's first rating of the sample) —.472 P.E. .078
r (rate, second sample, to writer's second rating of the sample) —.484 P.E. .078
r (rate, sample judged by student to be the better, to student's own rating of the sample) —.149 P.E. .098
r (rate, sample judged by student to be the better, to classmate's rating of the sample) —.352 P.E. .088

While none of these coefficients is significantly large, there is a greater degree of relationship between rate scores and quality ratings when the ratings were made by the writer than when they were made by the students. This difference is not, however, a very significant one. The critical ratio of the difference between the two most diverse and yet comparable coefficients (—.459 and —.149) to the probable error of that difference is 2.5. Wixted and Curoe (10) report a correlation of +.364 between rate and quality of handwriting, a finding contrary to our negative correlations. Starch (8:362) has reported that Freeman found small, and for the most part negative, correlations between rate and quality of handwriting. These coefficients were: for 4th grade .08, for fifth grade —.10, for sixth grade —.14, for seventh grade .37, and for eighth grade —.15.

RELIABILITY OF EXPERT RATINGS

To check the reliability of the writer's ratings of the samples, intercorrelations between his various ratings were determined. These are listed on the following page:

r (sample I, writer's first rating against writer's second rating) +.839 P.E. 030
r (sample II, writer's first rating against writer's second rating) +.844 P.E. 029
r (first rating, writer's rating of sample I against writer's rating of sample II) +.852 P.E. 028
r (second rating, writer's rating of sample I against writer's rating of sample II) +.816 P.E. 034
r (sample judged by student to be the better, writer's first rating against writer's second rating) +.826 P.E. 032

While these coefficients are not high, as reliability coefficients go, they are reasonably satisfactory for a quality scale. The following tabulations indicate how frequently the writer changed his ratings from one rating to another:

	Sample I	Sample II	"Better" Sample
Second rating same as first	22	26	23
Second rating higher than first—by one scale step	5	10	6
Second rating lower than first—by one scale step	17	8	15
Second rating lower than first—by two scale steps	1	1	1
	45	45	45

AGREEMENT AMONG RATERS

The following coefficients of correlation are all based upon ratings of that specimen of handwriting which the student regarded as his better sample.

r (self-rating with classmate's rating) +.310 P.E. 090
r (self rating with writer's first rating) +.534 P.E. 072
r (self-rating with writer's second rating) +.534 P.E. 072
r (classmate's rating with writer's first rating) +.630 P.E. 061
r (classmate's rating with writer's second rating) +.727 P.E. 047

In no instance is the degree of agreement significantly high. Apparently the writer's ratings against the scaled specimens agreed better with the classmates' ratings than with the students' own ratings, so far as the relative standing of a student in the group was concerned.

SUMMARY

Forty-five university seniors preparing to teach provided two specimens of their handwriting by writing and re-writing the eighth grade selection of the American Handwriting Scale. The students themselves rated their

writing as average, or better, for legibility. Their classmates rated it as much better than average. An expert rating against scaled specimens of eighth grade handwriting classed about three-fourths of the specimens as below average in quality. Girls tended to write somewhat better than boys. The specimen written first tended to be the better in quality.

The students in this group wrote much faster than is ordinarily expected of eighth graders. There is a slight negative relation between speed and quality of writing. Expert ratings of handwriting are reasonably reliable but do not agree well with self-ratings.

IMPLICATIONS

If the students in this study produced about as good a sample of their writing as they could, and there is every reason to believe they did, then their best is none too good. In particular, those students whose writing was judged "poor" or "very poor" by the scale, about 40 per cent of the group, did not write well enough to meet the ordinary requirements of classroom usage. They should write better, especially in view of the fact that they plan to be teachers. So far as these subjects are concerned, there is something to be gained from a study like this by way of increased interest in legible writing. The students enjoyed and were impressed by the results of the study. The writer was disappointed by the dearth of literature on the handwriting of college students.

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THE CONSTRUCTION AND EVALUATION OF CERTAIN READINESS TESTS IN COMMON FRACTIONS*

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Editor's note: Much valuable work has been done in recent years in the field of readiness testing. The study here reported makes a contribution to this work in the field of arithmetic.

THE INTRODUCTION

The Problem—The fundamental object of the investigation was to determine whether the use for instructional purposes of certain readiness tests in common fractions differentially affected the learning of pupils of varying levels of intelligence, and of varying levels of performance on the readiness test, as shown by scores on an end or criterion test of the arithmetical process in question. If the effects of the use of the readiness test for the purposes of instruction are differential, which pupils profit most from its use, those of low mental ability and low initial scores on the readiness test, those who stand high in regard to these two pretest variables, or those at some other level of performance on either of the pretests?

Specifically, if the results on a test designed to show readiness to add common fractions are used for instructional purposes, will the use of such returns differentially affect the learning of pupils in reference to the process, addition of fractions, as measured by a suitable criterion or end test? If similar results on a test designed to show readiness to subtract common fractions are in like manner used for instructional purposes, will such use significantly affect the learning of subtraction of fractions, as measured by the end test?

DEVELOPMENT OF THE READINESS AND END TESTS

The Readiness Tests—It was necessary to construct a test to show readiness to add common fractions, and also a criterion test in this skill to be administered at the close of the period of instruction. Likewise a suitable readiness test and an end test in subtraction of common fractions were not available, and had to be constructed.

* Based on the result of a graduate study conducted under the direction of Dr. Leo J. Brueckner, Professor of Elementary Education, University of Minnesota.

The outline of procedure used in the construction of a given readiness test included the analysis and listing of the informations and skills that are deemed prerequisite to the ability in question, the construction of a large number of items to cover these informations and skills, the informal try-out of these items, the final selection of test items, and further refinement to establish satisfactory validity and reliability. The readiness test explored the experiential background as this had to do with skill in computation and the understanding of fractional concepts. Abilities in fractions, as stressed by different parts of the tests, included recognition of fractions, expression of fractions, size comparison, and matching. The exercises in matching had to do with the use both of diagrams and of numbers. The diagnosis afforded by the results from the readiness tests was the basis of the teaching.

The techniques used in construction were (a) an individual item analysis with the total score on the readiness test as criterion in order to ascertain the "internal consistency" of the test, (b) an individual item analysis with the total score on the final or end test as criterion to demonstrate the validity of the readiness test as a means of prediction, and (c) the derivation of the coefficient of reliability by means of a formula suggested by Kuder and Richardson. (1) This work was carried to the point at which the readiness test showed reasonable consistency and validity. Furthermore, each readiness test yielded a coefficient of reliability of plus .90 or better.

It was shown that if in the work of addition of unlike fractions, material is included in the readiness test that properly belongs in the end test, the results on such items, in terms of pupil performance on the readiness test will be negligible. If a similar thing is done in the case of subtraction of unlike fractions, the results on such readiness test items will be somewhat better than the results in addition. Pupils, as a rule, do not master a given arithmetical process until the need for such mastery arises in the classroom.

The inter-correlations among the several parts of either of the two readiness tests range from plus .36 to plus .53. There is some "communality of function" among the several sections of either of the readiness tests. The fundamental consideration in the construction of these instruments was diagnosis. As between any two parts of a given readiness test, it is to be expected that there may be some "overlapping".

The coefficients of correlation for predictive purposes on the two readiness tests, (the one for addition of common fractions and the other for sub-

traction of common fractions), range from plus .60 to plus .70. These values are as high, or possibly higher, than similar findings reported in recent research in reading and in arithmetic.

The test to show readiness to add common fractions was marked R_{12} and labeled *Readiness Test for Adding Fractions.* The test to show readiness to subtract common fractions was marked R_{45} and labeled *Readiness Test for Subtracting Fractions.*

The Criterion Tests—The end or criterion tests used in the study and designated F_2 and F_3 were constructed from "blue prints" or charts devised by the author under the direction of a specialist in arithmetic. The first criterion test is a final achievement test in addition of common fractions, and the second is a similar test in subtraction of common fractions. A third end test, F_1, was used in one part of the study. It is a final test in addition of common fractions. This test was devised by Dr. Leo J. Brueckner of the College of Education, the University of Minnesota. On the basis of the results of a re-test after eight days, these three criterion or end tests showed reliability coefficients of plus .78 or better.

The Administration of the Tests—The tests were administered by one individual, the investigator, to a total of 1038 5-A pupils of the public schools of Minneapolis and of St. Paul during the school year of 1939–1940. The technique for the administration of the readiness tests and the end tests was standardized. The intelligence examination used in the study was selected on basis of reasonable technical merit and suitability for the work in hand. It was *The California Test of Mental Ability—Elementary Series,* Grades 4–8.

THE EXPERIMENT AND ITS RESULTS

The Definition and Use of the Experimental Factor—The experimental factor is the use for instructional purposes of the results on two readiness tests, the one measuring readiness to add common fractions, and the other testing readiness to subtract common fractions. The problem suggests the application of the matched group technique. Two groups of grade 5-A pupils were equated on the two background variables, mental age and results on the readiness test. The control group was characterized by the absence of the experimental factor, and the experimental group by the presence of that factor.

Other background variables that might vitiate the results of the experiment were investigated and accounted for. These included ability to read,

chronological age, sex differences in test performance, the length of time devoted to the learning process in question, the socio-economic background of the pupils, and the differences and peculiarities in instructional procedures from teacher to teacher and from school to school.

Four specific steps were taken to secure an adequate use of the experimental factor in the experimental group:

(a) A preliminary conference was held in every case with the teacher and principal in charge of an experimental group in regard to the fundamental problems of the study, and the means by which it was to be solved, especially the details relating to the experimental group.

(b) This information was put in writing and copies were left with the teachers and principals in charge of the experimental groups.

(c) A "log" kept by the teacher showed the application of the experimental factor in the experimental group.

(d) Frequent visits to the experimental classrooms by the investigator provided detailed information as to the progress of events in the application of readiness tests in instructional procedures.

Experimental Design—Two types of experimental design (2) were used in the study. *Design I* means that in the control section the personnel of the teachers was entirely different from that in the experimental section. For use in the control section under *Design I*, complete sets of data were secured from 378 pupils under eleven different teachers. The experimental section under *Design I* provided complete sets of data from 383 pupils under eleven teachers.

Design II was quite a different matter. Here we had "the same teacher in the same school". During the first semester of the school year of 1940–1941 she was in charge of a control group; and during the second semester of the same school year she instructed an experimental group. Four St. Paul schools were available for experimental work under *Design II*. This involved the co-operation of four teachers. During the first semester these four teachers instructed 139 pupils in the control section. During the second semester these four teachers instructed 138 pupils in the experimental section.

Solutions Under Design I—Three sets of data under *Design I* were secured during the course of the study. For this type of problem the more generalized form of the Johnson–Neyman technique (3) was used. The first step was to set up the hypothesis that, in the population from which the samples were drawn, the value of the differences between control and ex-

perimental groups in the final measurement was zero. The analysis showed whether this hypothesis was tenable. This analysis consisted essentially in obtaining for each set of values of the basic matching characters an estimate of the difference in the final measurement between the experimental and the control groups. To obtain this estimate, the linear regression of the final measurement upon the basic matching characters was found separately for the two and the difference between these two regression values was computed. In the examples that follow, the final ratio value has been referred to the F of Snedecor's tables for interpretation.

A. *Example 1, Design I.* The reader will recall that, under *Design I*, the teaching personnel in the control section was entirely different from that in the experimental section. In example one of design one in addition of common fractions there were 91 pupils from three different teachers in the control group and 100 pupils from three different teachers in the experimental group. The mathematical result of the comparison of the control group with the experimental group was an observed value ($w_{obs.}$) at 1.827 as against a tabular value at the one per cent level, ($w_{.01}$), at 27.366 and a tabular value at the five per cent level ($w_{.05}$), at 47.557. The difference value was significant at the one per cent level, since 1.827 is less than $w_{.01}(27.366)$. Therefore the evidence was sufficient to reject the hypothesis that the experimental and control groups were essentially the same in end test performance after due care had been taken to match these two groups on the two basic characters, mental age and performance on the readiness test. This difference was in favor of the experimental section and was significant at all levels of performance on the two pretests. That is, the "region of significance" included all of the individuals in the experiment. Judging from the results of this experiment, it is likely that if pupils have had the advantage of the use of readiness test results in instructional procedures, such pupils will be better on a suitable end test than pupils in the corresponding control sections. And this finding in favor of the experimental groups may hold true at all levels of mental ability as shown by the intelligence test, and at all levels of performance on all parts of the readiness test in addition of common fractions.

B. *Example 2, Design I.* In example two of design one in subtraction of common fractions, there were 133 pupils from four different schools in the control group and 145 pupils from four different schools in the experimental group. The mathematical result of the comparison of the control

section with the experimental section on end test performance was a value of $w_{obs.}$ at 56.883 as against $w_{.01}$ at 40.416 and $w_{.05}$ at 70.103. This means that at the five per cent level there is a statistically significant difference in end test performance between the control section and the experimental section after due care has been taken to equate performance on the two background variables. This difference is in favor of the experimental section.

The region in which this difference is significant extends from approximately the fortieth percentile to the ninetieth percentile in mental age distribution, and from about the fifth percentile to the forty-eighth percentile in the readiness test distribution. That is, pupils whose scores fall within these ranges on the background variables may be expected to do significantly better work on the end test than is done by pupils whose scores in the pretests fall outside of this "region of significance". "The line of non-significance" passes through the field of cases. However, there is a decided trend in favor of the experimental factor. That is, in the great majority of cases, pupils may be expected to do better work on the end test if they are in the experimental group than if they belong in the control group.

C. *Example 3, Design I.* In example 3 of design one in subtraction of fractions, there were 79 pupils from two schools in the control section and 70 pupils from yet two more schools in the experimental section. The mathematical result of the comparison of the control section with the experimental section on end test performance was a value of $w_{obs.}$ at 7.368 as against $w_{.01}$ at 20.998 and $w_{.05}$ at 36.666. Even at the one per cent level, there is a statistically significant difference in end test performance between the control section and the experimental section. This difference is in favor of the experimental section. The region in which this significant difference is found includes pupils whose scores cluster near the means of the two background variables. It excludes pupils whose scores are either very high or very low. The region of significance also excludes pupils whose scores are erratic, i.e., high on one background variable and low on the other. The position of the line of non-significance in reference to the field of cases indicates that, for all individuals in the experiment, there is a trend in favor of the experimental factor. That is, pupils may be expected to do better work on the end test if they are in the experimental group than if they belong to the control group.

Solutions Under Design II—A. *Example 1, Design II.* It will be recalled that, under *Design II,* we had "the same teacher in the same school".

During the first semester she was in charge of a control group, and during the second semester of the same school year she instructed an experimental group. This design was repeated from teacher to teacher and from school to school, thus yielding a replicated experiment. This set of data represents the work of eight groups of pupils under the instruction of four different teachers from four different schools. Each teacher has, first, a control group, then an experimental group of pupils. A specialized form of the Johnson–Neyman (4) technique was used for the analysis of this set of data. The two background variables were mental age ratings and scores on test R_{12}, Readiness to Add Fractions. The end test used was F_1, Addition of Common Fractions. The application of the specialized technique to the data from this replicated experiment yielded a comparison which showed the experimental section to be significantly better in end test performance than was the control section, after due care had been taken to equate the two sections on the two background variables. The difference was significant even at the one per cent level.

B. *Example 2, Design II.* For re-definition of *Design II* see example one, design two above. The two background variables were mental age and performance on test R_{45}, Readiness to Subtract Fractions. The end test used was F_3, Subtraction of Fractions. The application of the specialized technique to the data from this replicated experiment yielded a comparison which showed the experimental section to be significantly better in end test performance than was the control section, after due care had been taken to equate the two sections on the two background variables. This difference was significant, even at the one per cent level of performance.

The findings in Examples 1 and 2, Design II are of special interest for the reason that, in the replicated experiment, control of the disturbing factor "difference in the quality of instruction from teacher to teacher and from school to school" is sought, not by the manipulation of statistical technique, but by the design of the experiment itself. In every one of the five solutions above recorded, the mathematic assumptions underlying the use of the comparison technique were satisfied before these techniques were applied.

THE CONCLUSION

The use for instructional purposes of certain readiness tests in common fractions differentially affects the learning of pupils of varying levels of intelligence, and of varying levels of performance on the readiness tests, as

measured by scores on the end or criterion tests of the arithmetical processes in question. It is possible that pupils at all levels of ability, as measured by the California test, and at all levels of performance as shown by scores on a given readiness test, may profit significantly by the use of readiness test results for instructional purposes. However, it is probable that, in a given set of data, significant differences in favor of the experimental factor will be found only at certain levels of attainment on the pretests. These levels will vary from one set of data to another.

The specific findings in support of the above generalizations are to be found in the solutions of five examples reported in this summary. Three of these are listed under Design I, as above defined, and two examples appear under Design II. In every one of the above five examples, the finding was definitely in favor of the experimental factor.

The implications for teaching are clear. The use of the diagnostic readiness test for instructional purposes differentially affects the learning of pupils. This difference is decided in favor of the pupils in those classes whose teachers used the tests. It follows therefore, that wide use for instructional purposes should be made of properly constructed and carefully evaluated tests in addition and subtraction of common fractions.

At least one series of readiness tests in arithmetic is now available. This experimental edition covers processes in the use of number from the beginning of second grade work through grade six. These tests await experimental evaluation. Meanwhile, the tentative use of such measures for diagnostic and instructional purposes would seem to be indicated by the findings in the present study.

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EMOTIONAL INSTABILITY AND TEACHING SUCCESS

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Editor's note: Supervising officials and others have come to recognize the importance of emotional stability of teachers and the effects of unstability upon pupils. The author believes that teachers can be bettered in this respect through effective leadership.

IT SEEMS quite generally recognized that one of the main problems facing teacher education institutions is that of the selection of the most promising from the prospective students who offer themselves to the institution. There is a common statement to the effect that such institutions do not use sufficient care in selecting from the entrants those who will ultimately make good teachers. Ryan[1] states, "No plans for better teacher preparation can omit consideration of the selection of candidates for training. Though there is general agreement as to the need of more satisfactory selection of those young people who are to be encouraged to go on for the work of teaching, little has been done about it." He[2] also states, "Not only has there been little effort to select for teacher training candidates who are good prospects from the point of view of mental health, but there is some competent opinion to the effect that, if anything, present methods of selection tend to favor a type of candidate whose influence upon children in school is unfortunate." The teacher education institutions on the other hand say that they would be glad to make such a discrimination if there were any means at hand for assuring themselves that their selections had any real meaning. A recent publication[3] states, "It is not easy to make wise selection. While virtually everyone seems to favor a higher standard of selection, there is much vagueness and uncertainty about how judgments could best be made. The serious limitations of existing record blanks and objective tests is readily apparent, in relation to our objectives. The various schools and colleges which have programs of selection in operation have felt more confident of their ability to select for good academic work than of their ability to select

[1] Ryan, W. Carson, "Toward Better Education for Teachers," *Mental Health Through Education,* The Commonwealth Fund, pp. 120.

[2] Ibid, "The Teacher's Personality," pp. 23.

[3] Watson, Goodwin–Cottrell, Donald P.–Lloyd-Jones, Esther M. "Selection for the Educational Profession," *Redirecting Teacher Education,* Bureau of Publications, Teachers College, Columbia University, pp. 11–12.

good teaching personalities. The more we consider selection, the more evident is the difficulty of measuring the qualities in which we are most interested." As Dr. Neal Billings[4] writes, "Pre-service selection of teachers is not justified to any great degree by the scientific evidence now available." Frank E. Baker[5], also, says, "Still another difficulty is the selection of technical means of evaluating personalities. While we have achieved the ability to measure scholarship and to a certain extent native ability, we have not yet developed the technical means of determining personality traits and emotional adjustments. Until we develop the means to do this, we shall not be able to pick out the best people to teach in our schools." Lee[6] is more dogmatic than other authors and states that "In general, inferior teachers feel more fear, more distress, more anger, more disgust, and more lust, whereas the superior teacher has more of the tender feeling, more amusement, more curiosity, greater creativeness, and better emotional stability." He[7] also states, "The consensus of opinion seems to be that instead of being a well-adjusted group, teachers are more poorly adjusted than the average person." In view of the references which have been previously cited, it seems doubtful if there is sufficient evidence for making such dogmatic statements. Prescott[8], also, lays stress on the necessity of selecting teachers with proper emotional characteristics. He says, "If teachers be equally unselected as to emotional characteristics a great deal of tension and maladjustment must arise and many educative opportunities will be lost." . . . "In the initial admittance of prospective teachers to training institutions, cases of extreme maladjustment or unstable temperament must be excluded and continuous personnel work during training and apprenticeship periods must be carried on with those admitted."

While there is this common acceptance of a normal emotional adjustment as an important characteristic of those who are intending to become teachers, there has been relatively little done in the way of investigation to

[4] Billings, Neal, "Selection and Guidance in Teacher Education," *Teachers for Democracy*, John Dewey Society Fourth Yearbook.

[5] Baker, Frank E. "Recruitment, Selection, and Guidance of Teachers," *Bennington Planning Conference*, Commission on Teacher Education, American Council on Education.

[6] Lee, J. Murray & Lee, Dorris May, "A Developing Personality," *The Child and His Curriculum*, D. Appleton–Century Company, pp. 99–100.

[7] Ibid, pp. 97.

[8] Prescott, Daniel A., *Emotion and the Educative Process*, American Council on Education, pp. 277.

find out just how far emotional maladjustment is a factor in teacher failure. While individual opinion recognizes extreme cases and draws subjective conclusions as to the importance of emotional adjustment, it is quite a different thing to say to an individual that you should not continue your preparation for teaching, because you are emotionally unsuited for the profession. The work of Dr. Townsend at Newark and Dr. Zachry at Montclair is well known. Both of these individuals rather than to attempt to bar candidates from admission to the college laid the emphasis upon aiding prospective teachers to better their emotional adjustments. The work which is described in this paper was, in the beginning, motivated by such a purpose.

About eight years ago the writer began to make some investigations along the line of the relationship between emotional maladjustment in student teachers and success or failure in student teaching in the campus training school of the State Teachers College at Mansfield, Pennsylvania. A preliminary report upon some of that work was published in the Fifteenth Yearbook of the Department of Elementary School Principals of the National Education Association.[9] At that time the interest was largely confined to the period of student teaching. The procedure was to give to the beginning student teacher the Pressey X–0 Test and to follow this with a personal interview with the student in order to determine the background of the maladjustment, if there was any, and to assist the student teacher to overcome the trouble. While this work was not very scientific, yet it met with a very favorable response on the part of the student teachers themselves and was considered by them to have real value. As the work was continued the Bernreuter Personality inventory was recommended as one which would give better results for the purpose. For a time both were used. The Bernreuter Test seems to be excellent for diagnosing difficulty, but the Pressey X–0 Test gave a better basis for the individual interview because it gave clues which would assist the interviewer in locating the source of the maladjustment. As was reported in that article "The most common type of maladjustment discovered was undue self-consciousness, personal sensitiveness, or an inferiority feeling. There were only two cases with obvious paranoid tendencies. The second most common maladjustment was fear of, or

[9] Retan, George A., "Emotional Maladjustments of Prospective Teachers," *Personality Adjustment of the Elementary School Child*, Fifteenth Yearbook, The Department of Elementary School Principals, National Education Association, pp. 423–427.

worry over illness. This difficulty was usually combined with a fear of not being able to finish the teaching requirement for graduation."

After continuing this work for several years the writer realized that many of those to whom as student teachers he had given the test had now been teaching in the nearby schools for a period of from two to five years and that it would be possible to get a check on the success of the individual in the field. Consequently, a list was made up for each county of those teachers for whom there was a clear record in the files of the director. The county superintendent in the county concerned was asked first, to rate the teacher on the basis of poor, fair, good, excellent; and secondly, to indicate whether in his opinion, or according to his observation, there was any apparent connection between the individual's success or failure and his emotional adjustment. The county superintendent did not have any data from the director which would help him to make his evaluation in terms of any previous tests or interviews. It is admitted that such an evaluation on the part of the county superintendent is purely subjective and is open to criticism from a scientific point of view. On the other hand, the evaluation of teaching is after all almost always subjective. It is a common sense method and county superintendents have been long enough in the field that their ratings on such a scale as this may be considered reasonably accurate. Teachers who were rated poor or fair were considered to be failures. Teachers rated good or excellent were considered successful.

After a careful elimination of all cases where the records were not clear there were left 152 individuals, none of whom have taught less than two years, for whom there was a good record. Of these 73 had originally tested as having emotional stability, 79 had tested as being unstable in some degree. In many cases, of course, the instability had been slight, but any instability was considered as sufficient grounds for throwing that individual in the unstable group. Of the 73 who had been considered stable, 55 or 75.3% were rated by the county superintendent as good or better. 18 or 24.7% were rated by the county superintendent as fair or poorer. Of the unstable group of 79 individuals approximately 50% were rated by the county superintendent as good, and the same percentage as poor. That is of the whole group of 152 teachers, 96 or 63% were rated good by the county superintendent. The following is a tabulation of these data:

SUPERINTENDENT'S RATING

Emotional Stability	Good to Excellent		Fair to Poor		Total %	
	no.	%	no.	%	no.	%
Stable	55	75.3	18	24.7	73	48
Unstable	41	51.9	38	48.1	79	52
Total	96	63.2	56	36.8	152	100

The value of the CHI-square on the hypothesis of independence for this table has a highly significant value, thus supporting a real relationship between the two factors.

This would seem to indicate that the chances of a stable teacher making good in the field were much greater than those of a teacher showing even a slight degree of instability. It will, however, be worth while to make a more careful analysis of these four classes in order to see whether further light may be gained on the problem.

In the first place it will be of interest to see whether or not these individuals showed the same tendency toward success or failure in the campus laboratory school that they did in the field. In other words, what is the correlation between the rating given by the laboratory school supervisors and the rating given by county superintendents? Of 96 teachers who are rated good by the superintendents, the supervisors rated 32.3% as *D* or *C*. Of 56 teachers rated fair or poor by the superintendents, the supervisors had rated 37.5% *B* or *A*. In general, of the 152 cases the supervisors agreed in their rating with the superintendents on approximately two thirds of the number. A tabulation of these ratings follows:

COMPARISON OF RATINGS OF SUPERINTENDENTS AND SUPERVISORS

Rating of Superintendents	Ratings of Supervisors					
	A or B		C or D		Total	
	no.	%	no.	%	no.	%
Good to Excellent	65	67.7	31	32.3	96	63.2
Fair to Poor	21	37.5	35	62.5	56	36.8
Total	86	56.6	66	45.4	152	100

What are some of the reasons which superintendents give for rating as poor teachers who showed normal emotional stability? These are: poor scholarship, lack of definiteness, lack of initiative, did not like to teach, non-social, has other interests, inclined to scold, lazy. In at least five cases there is a definite statement of self-consciousness or lack of confidence, although in the original test the individual did not indicate any such condition. In the record of the individuals who are rated as good even though they originally tested as emotionally unstable, there is noted a considerable number of whom the statement is made that they had gradually developed greater confidence in their ability. In other words, while these individuals showed some instability at the beginning, evidently they overcame this as they continued teaching and have made themselves good teachers. It would be interesting to know, but probably impossible to determine, whether or not the interview with the director had anything to do with the subsequent conquering of the lack of confidence. In the case of those individuals who showed an inferiority complex the county superintendents report a considerable number as dominating. This agrees with the conclusion of the yearbook *Fit to Teach*[10]. It is there stated that "An unfortunate mental attitude closely akin to authoritarianism—perhaps only a more extreme form of it—is the domineering, imperious attitude which teaching seems to develop in certain individuals. In some instances, domination and exploitation of pupils seems to be the means of compensating for a deep feeling of inferiority—a neurotic escape." This is especially true of those teachers who are rated as good. In other words, the county superintendent in those cases did not seem to feel that the fact that the teacher was of a dominating type made her a poor teacher. For instance, the following is a quotation from one case, "Good teacher, dominating but considerate, excellent leader." Another quotation, "Dominating, but tactful." Here, of course, we are in contact with the older conception concerning discipline, and it is possible as judged by modern standards that some of these emotionally unstable teachers would not be rated as good by a supervisor who had had more training in mental hygiene.

It may also be interesting to quote the statements of the county superintendents concerning some teachers who were markedly unstable, but who

[10] *Fit to Teach*, Ninth Yearbook, Department of Classroom Teachers, National Education Association of the United States, pp. 88.

have proved to be successful teachers in the opinion of those who rated them. The following are statements made concerning individuals of this type:

1. Reliable; conscientious about work; has given good satisfaction in community.

2. Quite nervous during first year, now appears more stable; ambitious.

3. Excellent teacher; dealings with children quite frank; no inferiority complex.

4. Good teacher; unhurried; self-possessed.

5. Good to very good teacher; good opinion of herself, but can deliver the goods.

6. Quiet, unassuming; has initiative; very good teacher.

7. Good teacher; self-conscious but seems to be gaining confidence; especially good with young children.

Such statements as these go to show that even teachers who show strong emotional instability may develop in the field and become competent and efficient personalities.

The records of these 152 individuals therefore indicate that emotional instability is not conclusive evidence of unfitness for teaching. To bar all who showed instability would apparently eliminate some thirty per cent who, by present standards, are classed as good teachers. The safer procedure is that adopted by those who help the candidate while in college to overcome the condition and thus lay the basis for the development of a normal adjustment.

CLASS OBSERVATION–PARTICIPATION AS A FACTOR IN TRAINING TEACHERS

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Editor's note: Learing and teaching presuppose observation, participation, and verbal communication in varying amount for different subjects, persons, and goals. The author reports good results from the use of observation in the training of teachers.

TEACHER training institutions generally schedule observation periods as an integral part of the required work in those courses which deal particularly with pupil-teacher relationships. However, there seems to be little evidence available to indicate to what extent these periods should be purely observation. It has been believed by some educators that, in many cases, actual participation by the prospective teacher in the activities of the class under observation not only motivates that individual to become a more effective teacher in practice, but may result in learnings which are usually not achieved through class instruction and observation not coordinated with participation in the activities under observation. Practice teaching has been required before completion of teacher training courses to provide experience, but it has been maintained not infrequently that participation could be used to advantage more extensively and earlier in the educational program.

The experiment which this paper summarizes was undertaken to determine whether participation by prospective kindergarten teachers in the activities of a kindergarten group under observation would be more effective than observation alone. For purpose of experiment, two groups of college students were selected which in this account are referred to as Group A and Group B. These two groups were sections of a class in Kindergarten Education (Education 3) in Teachers College in the University of Nebraska. Group A, composed of twenty-eight students, met twice weekly at nine o'clock. Group B, containing thirty-one students, also met two times a week at two o'clock. No effort was made to equate the sections in terms of intelligence, scholastic averages, past experience, or any other objectively measured factor. There were, however, no apparent elements in the situation which would indicate that the two groups were significantly different in any respect.

The same instructor was in charge of both groups, and this instructor made a distinct effort to present the same classroom material in similar fashion to both groups. During the recitation periods, each group was given information which, if recalled at the time the test described below was administered, indicated satisfactory adjustments to typical kindergarten situations. All differences in treatment between the two groups were restricted, as far as such differences could be controlled, to the observation periods. During the observation periods, the students of Group A were encouraged to assist the kindergarten teacher whose class was under observation in the direction of the activities of the classroom. This assistance was so planned that at one time or another each of the members of the group was assigned the responsibility of directing several different kindergarten activities. Careful planning between the instructor of the college class and the demonstration teacher for the kindergarten insured an opportunity for the observation of most of the typical situations to be expected in any kindergarten. Exactly the same type of planning was followed by the college instructor and the kindergarten teacher for demonstration purposes to Group B. The difference in procedure was that the members of Group B were never given the opportunity to act in any other capacity than that of an observer in a kindergarten classroom.

At the end of the experimental period of one semester, an effort was made to measure objectively some of the learnings achieved by both groups. A test was devised in which a number of situations were suggested which can be confidently expected to develop in a kindergarten. The adjustments which the teacher should make to these situations were required as answers. The following excerpt from the test will indicate its nature:

Supposing you were a kindergarten teacher, what would you do *if* some children—

Had no handkerchief and needed one?
Seemed hot and irritable?
Annoyed others during rest time?
Did not put their things away?
Could not put on their wraps?
Could not recognize own galoshes or mittens?
Tore up someone else's work on way home?

Previous to the administration of the test, a careful consideration of possible answers was made and weights assigned to answers of varying merit.

On this basis a correct answer for each question would result in a score of 100. Less acceptable or incorrect answers would result in lower scores. Groups A and B were given the same test and their papers were scored by a reader who was unaware of the experiment being carried on.

The scores made in the test show several interesting characteristics. Scores in Group A ranged from *97 to 82*, with a mean score of *90.25* and a standard deviation of *4.21*. Scores in Group B ranged from *97 to 62*, with a mean score of *83.77* and a standard deviation of *9.01*. Further statistical treatment of the results obtained indicates that Group A showed a standard deviation of the mean of *.80* while Group B showed a standard deviation of the mean of *1.62*. It is apparent, therefore, that the difference in scores between the two groups is statistically significant, since in either case the mean of one group is further removed than the distance of three standard deviations of the mean from the mean of the other.

It is obvious, of course, that the number of cases involved is too small to make these statistical findings at all conclusive. But it does seem reasonable to assume that the difference in scores observed between the two groups is not entirely due to chance fluctuations in sampling. There is a possibility that other factors not taken into account in the selection and treatment of the groups may account for some and conceivable of all the difference in scores. Some of these factors, which may work singly or in combination, include differences in time of day for class meetings, difference in pupil intelligence and experience (for both the kindergarten and the college groups involved), and the unconscious effort on the part of the class instructor and the kindergarten teacher to achieve better results from one procedure than from the other. It is believed, however, that the experiment was controlled carefully enough so that there is a considerable chance that the method followed accounted for a large part of the observed difference in scores. Therefore, further experimentation along this line may indicate that a greater degree of participation by students in classroom procedures during the time they are acquiring their pre-service teacher training can be expected to result in the production of more capable and resourceful teachers. One possible outgrowth of such experimentation could be the inclusion of practice teaching as part of a teachers college program at an earlier time in the average student's program than is now done. A greater amount of practice teaching than is now required might be indicated, and the nature

of the practice might emphasize participation rather than the direction of activities, at least during the early stages.

In connection with the experiment, careful attention was given to the comments made during and after the observation period by the students of Group A. Among many spontaneous comments reported, those quoted below are typical and seem to indicate that the procedure may have served as an effective motivating factor.

"Let us have more participation time."

"I would rather teach little children than do anything else in the world."

"I am so thrilled with this work."

"How easily little children follow suggestions."

"Donald certainly lifted his voice when he played that music game."

"Mary wouldn't let me help with her snow suit. She is so proud she can put it on alone."

It is, of course, possible that the difference from the usual and therefore the expected observation procedure motivated the students of Group A to the extent that a higher degree of achievement was brought about. If so, the difference in learning should be ascribed to more effective motivation rather than to improved teaching technique. This possibility is suggested by the scores of the two groups. Individual students in Group B scored as high on the test as did students in Group A. Apparently it is possible for an individual to learn as much in the usual observation period as through greater participation, but the average of a group cannot be expected to be as great. The need for further experimentation under more carefully controlled conditions seems to be indicated by this preliminary investigation.

EDITORIAL

THE LEARNING CONFERENCE: THE BLENDING OF RESEARCH WITH TEACHING EXPERIENCE

Two situations have limited the effectiveness of educational psychology in the training of classroom teachers. One is that much of the psychological material in educational psychology courses is inapplicable to the problems that confront teachers in schoolroom settings. The other is that even though the materials were adapted to the needs of prospective teachers they could scarcely be expected to attain adequate knowledge and skill in directing classroom learning during the limited amount of time ordinarily devoted to the subject of educational psychology.

Because of these and other limitations, it is apparent that if educational psychology is to make any real difference in the thinking and teaching of teachers, the program of professional training should be a continuous one wherein the educational psychologist and the classroom teacher work together in the solution of learning and teaching problems. One means of achieving this aim is through the *Learning Conference* conducted for teachers on the job, the teachers presenting their own problems and suggestions for their solutions, and the educational psychologist contributing theories and research data.

The *Learning Conference,* as sponsored by the Bureau of Educational Research, University of Colorado, is now in its fourth year. In order that the program may fit the needs of the local school system it is planned a considerable time in advance and it is a cooperative affair involving contributions from the teachers, the superintendent and the educational psychologist. The preliminary planning includes consideration of the number of teachers at each educational level, appropriate time of the school year for holding the conference, time and place of meetings; preparation of suggestions to teachers for advance preparation and similar matters. The teachers are urged to give considerable thought to their frequently recurring problems of learning and

teaching and to be prepared to consider possible solutions. The value of the conference is determined largely by the care with which it is planned.

The conference as usually planned makes use of two types of program, one a general session and the other sectional meetings, adapted to the special needs and interests of smaller groups of teachers. The general session ordinarily consists of brief lectures by members of the University staff; some stress learning and others stress testing and evaluating. The purpose of these lectures is to present an overview of the problems of learning and evaluating and to set the stage for more detailed and analytic treatment of the problems chosen for special consideration in the sectional meetings.

Teachers most interested in learning attend a *learning* section; those most interested in measurement and evaluation an *evaluation* section. A specialist in elementary education serves as consultant for teachers in the elementary group; a specialist in secondary education serves as consultant for those of the high-school group. It is the duty of the chairman of each section to direct the discussion along pertinent lines and to prevent digression to topics unrelated to classroom learning and evaluation. A secretary keeps a record of all significant discussion and with the aid of the chairman prepares a summary of generalizations formulated by the group. The consultant for each section brings to the discussions research data and noteworthy practices in other school systems. Problems and opinions of teachers form the basis of discussion: it is predominantly a teachers' meeting.

The discussion in the sectional meetings, as those in the typical workshop, may lead in diverse directions and express the attitudes of individual teachers without coming to grips with a few significant problems common to members of the group. There is need for good leadership. The chairman of each section must at all times direct the discussion toward significant problems and prevent its being dominated by certain individuals. It is difficult too, sometimes, for some teachers to profit from a modern discussion of learning and teaching because of either inadequacy of general education or lack of continued professional study.

The conference is ordinarily concluded with a general meeting, which the members of all sections attend. At that time each sectional chairman presents a summary of generalizations or viewpoints formulated by his group; if time permits, still further discussion by individual members is

encouraged. The purpose of the final meeting is to present for mutual benefit of elementary and secondary school teachers a summary of significant viewpoints developed by teachers and consultants. Detailed reports of sectional meetings are used in planning future conferences.

Perhaps the most significant contribution of the conference is the opportunity that it affords for blending theoretical and research data with teaching experience. The consultants bring to the conference recent theories and research findings regarding the nature and direction of classroom learning and evaluation; the teachers bring their most pressing learning and teaching problems together with their experience and observation concerning possible means of solution. The consultant becomes intimately acquainted with the everyday problems of the classroom teacher and consequently becomes more realistic in attitude toward his own teaching, research and writing. The teacher is stimulated to attack his teaching problems in the light of recent theory and research and to try out new techniques in the field of his teaching interest. The sectional meetings afford unique opportunity for teachers to present their problems, to share points of view with other teachers having similar problems, and to evaluate in the light of their own experience results of research contributed by consultants.

The conference is not a substitute for classroom visitation and individual conferences. Nor is it a substitute for systematic training in teacher-training institutions. Neither can the consultants, regardless of the breadth of their training and interest, advise with respect to all problems suggested by teachers. Then too, to make provision for the varied needs and interests of all groups, would require more consultants than are generally available. At best the educational psychologist may be a sympathetic co-worker. He may stimulate discussion; in no case should he be dogmatic in his attitude or hypercritical of the observation and experience of teachers.

Systematic criteria have not as yet been formulated for evaluating the results of the conference as judged by modification in teaching practice. The conference, at its best, may assist in bringing the teacher's professional knowledge up to date and affecting some change in his attitude. Its real contribution must be judged by the extent to which it has the effect of improving the quality of his teaching. The use of question forms devised to elicit voluntary expressions of opinion might be one means of appraising its results.

Measured improvements in teaching another. Informal expressions of opinion indicate that teachers welcome the opportunity to discuss with their colleagues and consultants their teaching and learning problems; they seem to be stimulated to advance professional study, and in some instances they try out improved techniques in their own classrooms.

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Research Abstracts and Bibliographies

Address research bulletins and other communications to A. S. Barr, Department of Education, University of Wisconsin, Madison 6, Wisconsin.

BULLETINS

BATHURST, EFFIE G. *Phonograph Records as an Aid to Learning in Rural Elementary Schools.* A Handbook for Teachers and Supervisors. Albany, New York: University of State of New York, the State Education Department, 1943. 171 pp.

A report of an experiment in the production of phonograph records and their use in rural schools, discussing programs of records that were tried; general use of records; incorporating the records in the school program; using records with organized activities; and results of the trial use of the records.

BOOKWALTER, KARL W. and CAROLYN W. *A Measure of Motor Fitness for College Men,* XIX, No. 2. Bloomington, Indiana: Bureau of Cooperative Research and Field Service, School of Education, Indiana University, 1943, 25 pp.

The purpose of this is to develop a measure of motor fitness for college men. Bibliography.

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BUNTING, DAVID EDISON. *Liberty and Learning.* Washington, D.C.: American Council on Public Affairs, 1942. 147 pp.

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CRISSY, WILLIAM J. E. and PEDERSEN, RUTH A. *The War-Time Role of the College Sophomore,* II, No. 3. New York: Cooperative Test Service, 1942. 40 pp.

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DAVIS, HORACE LEONARD. *The Utilization of Potential College Ability Found in the June, 1940, Graduates of Kentucky High Schools.* Bulletin of Bureau of School Service, XV, No. 1. Lexington, Kentucky: University of Kentucky, 1942. 101 pp.

Discusses college attendance according to potential college ability; the influence

of certain factors on college attendance, and case studies showing the influence of certain factors on college attendance. Bibliography.

DE BOER, JOHN J., Editor. *Policies and Practices in the Improvement of Reading.* Chicago, Illinois: The National Council of Teachers of English, 1943. 72 pp.

Discusses what we shall do about reading today; trends in remedial work; diagnosis and remediation in reading; systematic sequences in reading; the teaching of phonics; and teaching word-meaning through context.

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The author reviews the literature of children's reactions to the war with a report of a special study in this area. Bibliography.

EATON, MERRILL THOMAS. *A Study of Students Transferring to Indiana University from Other Colleges and Universities,* Bulletin of School of Education, XIX, No. 3. Bloomington, Indiana: Bureau of Cooperative Research and Field Service, School of Education, Indiana University, 1943. 39 pp.

After summarizing previous researches in this area the author discusses types of schools previously attended by transfer students; types of students transferring to Indiana University; and the achievement of students transferring to Indiana University. Bibliography.

ELSBREE, WILLARD S. *Pupil Progress in the Elementary School,* Practical Suggestions for Teaching, No. 5. New York: Bureau of Publicaitons, Teachers College, Columbia University, 1943. 86 pp.

This bulletin discusses a number of problems relating to pupil progress: promotion in the elementary school; why teachers fail pupils; the modern theory of school progress; classification and grouping; homogeneous grouping; cooperative teacher-administrative studies of the grouping problem; marks and the marking system; and reporting to parents.

Federal Aid for Education. Research Bulletin, XX, No. 4. Washington, D. C.: Research Division, National Education Association of the United States, 1942. 147 pp.

Discusses mobility of population; inequalities of educational opportunity; relative educational responsibilities of the states; relative economic ability of the states to support education; financial efforts of the states to support schools; probable allocation of funds under the pending bill; and next steps toward enactment of the pending bill. Selected references.

JOHNSON, LOAZ W. *The Administrative Function of English in the University of California,* VII, No. 4. Berkeley and Los Angeles, California: University of California Press, 1941. 77 pp.

Discusses one procedure employed at the University of California to determine whether applicants for admission could successfully do academic work at the college level.

Latin American Backgrounds. Washington, D.C.: Research Division, National Education Association of the United States, 1941. 48 pp.

An annotated bibliograph organized about such topics as the country; the people; the nation's work; transportation and communication; history and government; inter-American relations; travel; fiction; biography; and children's books.

LERNER, EUGENE and MURPHY, LOIS BARCLAY. *Methods for the Study of Personality in Young Children*, VI, No. 4. Washington, D.C.: Society for Research in Child Development, National Research Council, 1941. 289 pp.

Discusses experiments in free play; experiments in group play; experiments in active play techniques; and observing children in nursery school situations.

LINDLOF, JOHANNA M. and others. *Adventures in Camping*. New York: Johanna M. Lindlof Camp Committee for Public School Children, 10 Park Avenue. 70 pp.

A report of the camping activities of the New York Public Schools: activities at camp; camping as an essential part of democratic education; public school camping in the United States; what the campers say about camp; an objective appraisal; findings; and recommendations.

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An illustrated report of experiments financed by the Carnegie Corporation of New York.

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Discusses an overview of current trends; wartime changes; and serious current problems with some evaluation of trends and changes.

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This year book attempts to formulate a problem for further discussion and reflection, organized about three main topics: Why we need a method of practical judgment; toward principles of Method in practical judgment; and putting the method to work. Bibliography.

Salaries of City School Employees, 1942–43, Research Bulletin, XXI, No. 1. Washington, D.C.: Research Division, National Education Association, 1943. 23 pp.

Discusses trends in salaries, 1930–31 to 1942–43; the range and distribution of salaries in 1942–43; comparisons between positions and levels; and status of salary scheduling in city school systems.

SEAY, MAURICE F., Editor. *Theses in Education, 1937–1943,* Bulletin of the Bureau of School Service, XV, No. 3. Lexington, Kentucky: University of Kentucky, 1943. 59 pp.

Presents brief summaries of some one hundred and fifty masters' and doctors' theses.

SMITH, LLOYD C. *A Historical Outline of the Territorial Common Schools in the State of Kansas,* Bulletin of Information, XXII, No. 2. Emporia, Kansas: Kansas State Teachers College, 1942. 60 pp.

Discusses the schools before territorial period; early school laws; the territorial common schools; and pioneer views of education. Summary and bibliography.

SMITH, HENRY LESTER. *Education in Mexico,* Bulletin of the School of Education, XVIII, No. 4. Bloomington, Indiana: Bureau of Cooperative Research and Field Service, School of Education, Indiana University, 1942. 95 pp.

Discusses the background of Mexican education; the educational system of the country; preschool and kindergarten education; elementary or primary education; secondary education; teacher training and teacher training institutions; special education; various types of schools; higher education; and Mexican education of tomorrow. Bibliography.

TIDWELL, R. E. *Planning Improvement in Rural Living Through the Schools,* University of Alabama Bulletin, New Series, No. 256. University, Alabama: Bureau of Educational Research, College of Education, University of Alabama, 1943. 103 pp.

This bulletin reports an exploratory study of the educational problems arising out of a program of improvement of the living of rural people through the schools discussing such topics as: the college of education examines its job; making plans for the exploratory study; how the exploratory study worked; examples of plans found in progress reports; and summaries of identified needs and of helps requested for the implementation of plans.

Wisconsin's Changing Population, Publication IX, Bulletin of University of Wisconsin, No. 2642. Madison, Wisconsin: University of Wisconsin, 1942. 90 pp.

Discusses settlement and population growth; some quantitative trends in the population of Wisconsin; some qualitative aspects of Wisconsin's population; some factors that influence the quality of coming generations; economic considerations in a changing population; the role of education in population policy; and looking forward. Selected bibliography.

Research News and Communications

Address all research news and communications to Carter V. Good, Teachers College, University of Cincinnati, Cincinnati, Ohio.

Major Educational Issues. — Crucial problems of the year, and probably for the duration of the war, have been outlined for selected areas of education in the analyses that follow.

W. G. Carr of the N.E.A. identifies six issues that have been urgent in 1942, which will be crucial in 1943.

1. The relation of labor and business to education. This issue may be illustrated by the attack of the magazine *P.M.* on the National Education Association, because the N.E.A. held conferences with representatives of business on educational problems and other matters of common interest. It is also illustrated by the growing demands from organized labor that the principle of the labor movement be directly taught in the school.

2. How shall we organize education for world peace? This issue is well illustrated by the address made on the anniversary of Woodrow Wilson's birthday by Vice-President Wallace, in which he calls for supervision and inspection of the totalitarian school systems, and by Wendell Wilkie's apparent rejection of that suggestion in his address at Duke University about a week later. The Educational Policies Commission and several other agencies are preparing a report on the international use of education as an instrument for promoting peace and democracy.

3. What shall be the relation of the federal government to education? This issue is illustrated in the discussion of the Educational Policies Commission's report on the N.Y.A., the C.C.C., and the Public Schools, which went forward quite vigorously in the early part of the year, and by the failure of the Congress once more to enact needed federal aid for education.

4. Shall the secondary schools convert to the war effort, or shall they attempt to meet the war problems by minor adaptations of their program? This issue is rather fully developed and stated in the report of the Educational Policies Commission, entitled *What the Schools Should Teach in Wartime.*

5. What is the immediate future of higher education in view of the lowering of the draft age and the increasing demand for manpower and womanpower? The discussion of the Army and Navy plan for the colleges and the assignment of military personnel for training illustrate this issue.

6. Can the schools carry on in the face of the growing shortage of teachers? Studies by the Research Division, N. E. A., indicate a probable shortage of 50,000 teachers next year, unless something radical is done to meet the situation at once. There are many reports of high school graduates who immediately go into semi-skilled or even unskilled wartime employ-

ment and receive a great deal more than the teachers and principals in the schools from which they have graduated. Teachers in some instances can leave their classrooms to go into war industry and make more money in a week than they formerly received in a month. This decline in the relative economic attractiveness of teaching as a profession, plus the curtailment of the supply of new teachers from the colleges, plus the drafting of men teachers, creates a major educational crisis.

A. J. Klein of Ohio State University considers the following five problems most urgent in the field of education and educational administration, especially with respect to the public school program:

1. The adjustment of programs to local community needs and situations, especially as these are made critical by war conditions. The Victory Corps has been of some assistance in this process, but much more will have to be done, and more thoroughly, if these adjustments are made in curriculum, in administration, and in the public relationships of the schools, including the colleges.

2. The problem of financial support has been critical and is becoming increasingly so. As it affects the staff of the schools, some salary increases have been made, but relatively few means have been found to increase revenue in proportion to the increased demands and costs of the school and college enterprise.

3. The issue of staffing public schools in competition with industry, government, and military service is in part a financial problem, but also involved are problems of personal adjustment of ideas as to how one may be most useful socially. This problem has been met in part by recruiting older teachers, by lowering standards for admission to the profession, and by the migration of teachers from more poorly paid states or regions to areas with higher salary scales or better working and living conditions. In 1943 this problem of staffing will become much more acute, since by that time we will have exhausted or nearly exhausted the hidden resources already discovered. This means that allocation of manpower and adequate compensation will have to receive much greater and more effective attention.

4. Another problem of both public schools and colleges is that of securing administrative understanding and control of the variety of impacts of various campaigns and demands on the schools. For most administrators information and understanding of what is needed and desired have been secured piecemeal, if at all, and frequently both understanding and control are delayed because of the vagueness and propaganda nature of information available. The professional literature, especially that issued from the Office of Education, has been very helpful, but the situation is still unsatisfactory. It is understood that at the beginning of 1943 there were 63 national campaigns being directed or authorized as from Washington. School administrators, as well as others, cannot make judgments concerning the distribution of energies and their functions, unless they have some overall view of the variety and meanings of these demands.

5. The guidance of students, both in high school and in college, is a problem of long standing whose critical character is emphasized by the present social and economic situation. As a result of these external pressures, more emphasis has been given to this area, but in 1943 a great deal more attention and money must

be devoted to this service, unless the schools are to break down in the performance of their functions.

Karl W. Bigelow lists six urgent educational issues with which the Commission on Teacher Education is concerned:

1. The teacher shortage: How hold experienced teachers who are tempted by higher salaries in work that *seems* closer to the war effort? How maintain enrollments in curriculums preparatory for teaching? How find emergency teachers of the best sort and how help them rapidly to become able to do a competent job? Over 150,000 copies of the Commission's statement, *This War and the Teacher*, have been distributed.

2. The in-service education of teachers: How encourage teachers in service to become (or remain) eager to grow continuously in competence? What resources should be provided by school systems and colleges to facilitate such growth? This problem is made especially critical by the facts that: (a) many new demands are being made on all teachers because of wartime changes in the curriculum; (b) many emergency teachers, mostly substandard, are being employed.

3. How provide adolescents—high-school and college youth—with more first-hand experiences, dovetailing in effective fashion with school and college work? This issue is likely to be dormant during the war, but will become critical when it ends.

4. How much and what kind of education are important in wartime? Should most adolescents go into military service, or go to work, or at least give all their energy to studies specifically preparatory to such action? Does general education have no function in wartime?

5. What does recent experience show was *really* wrong with our educational practices? There is much unreasonable suggestion that education should have produced just the right number of people with just the right training for services suddenly needed in wartime. Now there is a danger that we will both over-convert and also freeze the conversion—forgetting to prepare for peace now, and continuing to prepare for war after war has ended. On the other hand, no doubt important weaknesses of education stand revealed. What would a sound evaluation reveal?

6. How can teachers, perhaps especially college professors: (a) attain an informal friendliness towards all students; (b) attain an active sense of social responsibility; and (c) learn how to work together more effectively as a group of educators?

R. W. Tyler of the University of Chicago suggests the following issues as among the most important of the year:

1. Whether the school and college curriculum should become a hodgepodge of specific activities recommended by various pressure groups and presumed to contribute to the war effort, or whether the basic principles guiding curriculum construction and development should be applied to war curriculum, as well as to the peacetime program. A solution may be in the reëxamination of the entire secondary-school and college curriculum, with a view to identifying the most important material, on the assumption that general education will need to be completed by age 18; followed by reorganization and rebuilding of the curriculum.

2. Whether the training program for officers and other leaders in the Army should consist solely of specific vocational materials or whether it should have a broader orientation. A solution involves

cooperative planning on the part of civilian and military educators.

3. If most male college students will now be able to get only one year of college instruction, should that be the present freshman program or should that one year be planned specifically in terms of what is the most important education to provide?

4. Should the education, training, and experience in the Army and Navy be given educational credit on the basis of the amount of time served or types of experiences had, or should they be credited on the basis of the educational competence gained by the soldier or sailor? The work of the advisory committee of the Army Institute may largely solve this problem by providing methods of accrediting on the basis of competency.

5. Should the school or college curriculum be organized in small isolated courses or departments, or should it be planned and developed in terms of large blocks involving the co-operation of various instructors and departments?
This problem is being solved partially by the experimental curriculums being developed by a few schools and colleges.

6. Should general education be planned so as to be completed not later than the end of the fourteenth grade, preferably by the time the student is eighteen years of age, and symbolized by a Bachelor's degree, or should general education be mixed with special and vocational education and extended over a much longer time period? The experimentation of the University of Chicago may help to provide data to assist in solving this problem.

Roscoe Pulliam of Southern Illinois Normal University names five urgent educational issues of 1942, all of which remain crucial for 1943:

1. The problem of getting the Army and the Navy to use the facilities of the colleges for training the young selectees in such a way as to give the colleges a chance to maintain themselves with credit during the war.

2. Saving liberal education from being obscured and pushed aside by the urgent practical demands of the armed forces and war industries.

3. Keeping the elementary schools, especially the rural schools, adequately staffed with reasonably good teachers.

4. Protecting the children of America against the hysteria, the demoralization, and the other evil physical and social effects of the war.

5. Counteracting the tendencies toward violent hate and jingoistic nationalism which war generates, partly to make possible a humane peace, but mostly so that our children will grow up into humane people in spite of the war.

F. R. Hamilton of the Wartime Commission, Office of Education, names six urgent problems:

1. How women can participate more effectively in the war program.

2. Acceleration in college schedules.

3. Teacher shortages in certain areas; for example, mathematics, science, and physical education.

4. Articulation between colleges and secondary schools.

5. Inter-American relations (educational and economic).

6. Essential modifications in educational procedures on elementary, secondary, and higher levels.

Partial solutions of shortages in manpower are: organization of WAACS, WAVES, SPARS, and training of women for industry; and retraining of teachers in

areas where shortages exist and bringing back to service teachers who had withdrawn or retired.

There is still a great deal to be done on the problems of how women can participate more effectively in the war program, articulation between colleges and secondary schools, inter-American relations, and essential modifications in educational procedures on elementary, secondary, and higher levels.

J. C. Wright of the U. S. Office of Education says that in the field of vocational education the most urgent issue has been one of adjusting the program to the needs of the war effort. This adjustment began in 1940 and no doubt will continue until the war ends. These needs are varied:

1. Providing war production training for workers in industries essential to the war effort.

2. Providing training for out-of-school youth and adults in rural communities that would enable farmers to increase food production.

3. To study constantly and evaluate the need for special training programs to relieve the shortage of office and store employees.

4. To study and evaluate the need for a special type of training for homemakers whose homes have been dislocated or affected by the unusual employments in congested centers where war industries are located.

In the case of problems 1 and 2, federal funds have been appropriated to provide the cost of training. In the case of items 3 and 4, proposals and estimates of the cost of carrying out such programs are in the course of preparation and consideration by proper agencies.

Such problems remain crucial for 1943 and will continue so throughout the period until the war ends. They will become more critical as the war continues.

In addition to the foregoing, the most important issue facing vocational education today is the problem with which we shall be confronted as soon as the war ends; namely, readjusting those in the armed forces and in civilian employment, where dislocations or shifts from peacetime occupations have resulted. As the seven to ten million in the armed forces are discharged from military service and go back to peacetime occupations, and as the twenty to twenty-five million men and women employed in industries essential to the war effort find that most of them must give up their wartime employment with high wages and go back to work in peacetime occupations, for which many of them will have had no previous training, issues for vocational education will arise to equal in many ways the problems of training for war production.

H. L. Forkner of Columbia University reports six urgent problems in the area of business education:

1. The necessity of revision of teachers' salaries in low-salary areas, to hold capable teachers of business skills that business and industry may continue to get from the high schools of the country a sufficient number of trained clerical workers. A few states are seeking to adjust teachers' salaries in the face of rising costs of living. This is not resulting in a satisfactory solution at present. There have been instances during the past year when business and government agencies paid students while taking commercial training, and in some instances this pay received by

the student was more than the teacher himself received for teaching the class.

2. The necessity for getting teachers to increase the tempo of teaching in skill subjects. A large number of schools are taking from two to three times as long to develop commercial skills as other schools. This results in tremendous loss of manpower at a time when it is badly needed. Special war training courses are being experimented with in a number of schools, which promise to give a new direction to the traditional training programs. Training programs operated by the naval training schools in various colleges and universities for the training of office workers are also indicating that skills can be learned in much less time than the traditional teacher has formerly believed.

3. The necessity for the extension of work experience along with the regular high school program, in order that the educational program in the high school may be more functional and in order to reduce the "breaking in" period when the student goes on the job. The need for office workers in many war industrial communities, such as Oakland, California, and Akron, Ohio, has led the high schools to set up work experience programs, whereby the pupil is in school one-half day and on the job one-half day. Thus far the pupils seem to be able to carry the regular high school program and their jobs without serious loss to either program.

4. The necessity for business teacher organizations to unite into one national federation or council, in order that the various publications now undertaken by professional teacher organizations may be directed more effectively toward critical problems of business education. At present the National Council for Business Education is attempting to bring together the publications and professional programs of the various professional organizations. The best prospect seems to be to extend the influence of the N.E.A. Department of Business Education, so that it really becomes the national teacher organization for business teachers.

5. The necessity for more intelligent guidance of students into educational programs in which they are most likely to succeed. There are still a large number of schools which operate under the policy that, if a pupil cannot succeed in academic subjects, he should take business courses. The demand for good office workers as soon as they complete high school is tending to emphasize the fact that not everyone can learn to perform technical office skills and that it is just as essential to select capable people for these training programs as for other more traditional educational programs. The reflection on the schools caused by poorly adapted persons is forcing some schools to give more attention to this factor.

6. The necessity for rendering the classroom teachers of the country aware of the place of basic research in their daily teaching activities, so that they are led to question the effectiveness of their ways of teaching and the reasons for teaching the present content. The first attempt to get business teachers interested in keeping up with professional activities on the research level was undertaken in 1942 by the organization of a Society for the Advancement of Research in Business Education. No one may belong to the society, unless he is actively engaged in pursuing a research project. This type of organization promises to be effective in stimulating research.

Each of these issues will continue to be critical during 1943. Probably the most

crucial one is that of retaining teachers to do the enormous job of preparing a sufficient number of office workers for government, business, and industry. At present the shortages in this phase of manpower are extremely acute. It is likely that teachers of other subjects less in demand today will have to be trained to take over commercial classes, in order to keep a supply of office workers flowing from the schools to the field.

Neighborhood Leaders and Wartime Action.—A recent development in the adult-education program of the Extension Services of the State Land Grant Colleges and the U. S. Department of Agriculture has been to set up a system for personally reaching every farm family with wartime information relating to farm problems.

With the help of local committees, the Extension Service delineated the rural areas into communities and neighborhoods, in each of which persons were selected and trained in the jobs they were to do. Each neighborhood leader had 10 to 20 families to reach in a neighborhood, to explain the "why, what, and how to do". The plan was based on the assumption that families would respond to and act upon timely information, if they were reached personally by someone who "knows" and by someone whom they "know".

To test this assumption, a study was made of the neighborhood minuteman system in Massachusetts after the plan had been in operation three months. Farm families were interviewed on the first two neighborhood leader jobs, to determine whether they had taken the action suggested by the Extension Service through the neighborhood leaders. These actions were "collecting and turning in scrap metal" and "ordering fertilizer early".

Seventy-six percent of the families who were reached by the neighborhood leaders, and only 42 percent who were not visited, collected and turned in scrap metal. Seventy-seven percent of the families who were visited, and only 27 percent who were not reached by the neighborhood leaders, ordered their fertilizer early. The comparisons in each case were between equivalent groups who could take the action suggested.

The personal-contact method in adult extension teaching has secured results in Massachusetts. A detailed report appears in: Fred P. Frutchey and James W. Dayton, *Evaluation Study of the Neighborhood Leader System, Berkshire and Essex Counties, Massachusetts,* May, 1942. Extension Service Circular 386, U. S. Department of Agriculture, July, 1942.